A BIOLOGICAL INVENTORY AND EVALUATION OF THE ORISKANY SANDSTONE WOODLANDS AREA OF NATURAL AND SCIENTIFIC INTEREST

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A BIOLOGICAL INVENTORY AND EVALUATION OF THE ORISKANY SANDSTONE AND WOODLANDS AREA OF NATURAL AND SCIENTIFIC INTEREST

(30 L/13 860560)

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Ontario Ministry of Natural Resources
Parks and Recreational Areas Section
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SUMMARY

The Oriskany Sandstone and Woodlands Area of Scientific and Natural Interest is located the Regional Municipality of Haldimand - Norfolk, spanning Oneida Township (lots 46 - 51, concession I) and North Cayuga Township (lots 46 - 51, concession IN). This is situated about 7 km west of Cayuga (Map / UTM 30 L/13 860560), and is situated in Site District 7 - 2 at the edge of the Norfolk Sand Plain and Haldimand Clay Plain Physiographic Regions. It has a surface area of 306 ha, all of which is under private ownership. The study area includes the Life Science ANSI, and additional areas related to the Oriskany Sandstone Earth Science ANSI.

The area is distinguished by the bedrock outcroppings of the Oriskany Sandstone Formation, of which this is the only provincial occurence. This area was recognized by many researchers as having the following significance:

- o This is the only outcrop of the Oriskany Sandstone in Ontario.
- o Karst landforms associated with this bedrock are of geological interest.
- o The natural vegetation associated with this bedrock is unique in Ontario.
- o The flora includes several nationally, provincially and regionally significant species.
- o The fauna includes a nationally, provincially and regionally rare and threatened snake population.

A conflict over the development of a quarry within this area in the 1970s was resolved through a compromise 'Environmental Protection Zone' on some of the property. Provincial park systems planning and the 1983 District Land Use Guidelines (Ontario Ministry of Natural Resources 1985) identified the area as an Area of Scientific and Natural Interest following research conducted in the past decade to identify areas of significant geology, vegetation, flora and fauna. The present report summarizes, expands on previous studies, and presents management considerations.

Earth science studies of Winder (1977 a), Davidson (1977) and others identified within the ANSI and its immediate vicinity 6 geological and geomorphological features which are of provincial or regional significance

PROVINCIAL SIGNIFICANCE

- o Oriskany Sandstone Bedrock - The only outcrop of this formation in Ontario; 90% of total natural exposure is within the ANSI.
- o Dry Lake Basin Sink Complex - Large example of this solution / collapse feature; occupies half of the ANSI's southern arm.

REGIONAL SIGNIFICANCE

- o Onondaga Escarpment - The western end of this Niagara Peninsula escarpment is in northeastern portion of ANSI.
- o Clay Knolls - Unexplained low circular mounds; 17 in ANSI and immediate vicinity.
- o Low Secondary Escarpments - 2 m to 3 m high escarpments with fossil features; 3 in the ANSI.
- o Local Sinkhole Collapses - Relatively undisturbed small karst

features; 3 areas in ANSI.

- o Drumlins - Western edge of drumlin field; barely touches on the ANSI.

The vegetation research of Maycock (1977 a) and others emphasized the significance of the oak - hickory forests which occur on the dry sandstone sites of the area. Further studies (Ball 1977, de Boer et al. 1982, Macdonald 1988) also recognized the significance of other upland forests, and of lowland and wetland features (Figures 6 and 9).

The present study recognizes 63 community patterns within the study area, based upon their substrates, composition, community structure and developmental history. The significant vegetation is that which is associated with, and dependent upon, the surficial and near surface exposures of sandstone bedrock, particularly since such environmental conditions do not exist elsewhere in Ontario. The present study identifies 6 significant upland dry forests and 4 barrens / meadows / thicket communities which are associated with the sandstone outcrops of the area. It also identifies 4 other significant forest communities which are associated with landforms other than the sandstone outcrops, notably the Onondaga Escarpment and local limestone outcrops. Further, it identifies 3 significant lowland forest / thicket communities which are characteristic of the Haldimand Clay Plain Physiographic Region, and 1 significant wetland meadow community which is dependent upon the distinctive drawdown features of the Dry Lake ponds. The potential for the contribution of the old and recent quarry communities to representation and site rehabilitation research are noted, and the status of the former prairie meadow is reviewed. Significant communities occurring withinthe ANSI are the following:

DRY SANDSTONE FOREST COMMUNITIES

- F-0 (Very Dry) - Dry: Oak Opening
- F-1 Dry: Forest
  Red Oak - White Oak - Shagbark Hickory
- F-2 Dry: Disturbed Forest
  Red Oak - White Oak - Trembling Aspen - Shagbark Hickory - Black Cherry
- F-3 Dry - Dry Mesic: Forest
  Red Oak - Bitternut Hickory - White Pine - Yellow Oak - Red Maple - White Oak
- F-4 Dry - Mesic: Sink Hole Mosaic Forest
  Red Oak - White Oak - Red Maple - Sugar Maple - Black Cherry - Large-Toothed Aspen - American Beech
- F-5 Dry Mesic: Forest
  Red Oak - White Oak - Sugar Maple

MESIC FOREST COMMUNITIES

- F-9 Dry Mesic - Mesic: Forest
  Red Maple - Red Oak - White Oak - Sugar Maple - American Beech - Shagbark Hickory - Bitternut Hickory - Eastern White Pine
- F-11 Mesic: Forest
  Sugar Maple - Red Oak - White Ash - American Beech
- F-12 Mesic: Managed Forest
  Sugar Maple - (Red Ash - White Ash)
- F-6 Dry Mesic: Successional Forest Complex
  Sugar Maple - Red Oak - White Oak - Shagbark Hickory - White Ash - Large-toothed Aspen

SANDSTONE PAVEMENT COMMUNITIES

- S-o Arid - Very Dry: Sandstone Pavement Barrens
- S-m Very Dry: Sandstone Pavement Meadow

S-t Very Dry - Dry: Sandstone Pavement Thicket
X-p Very Dry - Dry: Old Field Prairie Inclusions

LOWLAND COMMUNITES

L-b Very Wet - Saturated: Slough Thicket
Buttonbush

L-g Wet Mesic - Wet: Slough Fringe Grove
Silver Maple - Green Ash - Swamp White Oak - White Elm - Willow

L-2 Wet: Swamp Forest
Silver Maple - Green Ash - White Elm - Swamp White Oak

WETLAND BASIN COMMUNITIES

W-w Wet: Pond Fringe Drawdown Meadow

PRAIRIE COMMUNITY

PP Very Dry - Dry: Prairie Meadow

QUARRY SUCCESSIONAL COMMUNITIES

Q-o Arid: Recent Scraped Bedrock Pavement Preparation Barrens

Q-x Arid - Very Dry: Old Scraped Bedrock Pavement Preparation Barrens / Meadow

Q-q Arid - Very Dry: Quarry Basin Barrens / Meadow Complex

Q-t Very Dry - Dry Mesic: Quarry Basin Thicket / Meadow Complex

Q-f Dry Mesic - Mesic: Quarry Tip Pile Forest Complex

Floristic research has been conducted within the study area since the mid-1970s by Ball (1977), Maycock (1977 a), de Boer (1982), Suffling (1988), Alex (1977), Sutherland (1985, 1986), Kaiser (1986), Macdonald (1976, 1988) and others. This documented a total flora of 627 species, including 8 hybrids, 11 infraspecific taxa and 144 non-native species. The species exhibit affinities to the southern, Carolinian and northern floras. There also are 'dry prairie' affinites for which 29 characteristic 'species were recorded from the former prairie meadow, 16 of which do not occur elsewhere in the ANSI. About 23% of the species have Old World origins. 71 significant plant species occur within the study area, including 12 which are nationally and provincially rare, 27 which are regionally rare, 22 which are regionally very uncommon, and 10 which are newly reported from the Haldmand - Norfolk. Concentrations of the nationally and provincially species occur in 5 sections of the ANSI: around the Dry Lake Basin (UTM 864544), south of Town Line Road (UTM 862552), north of Town Line Road (UTM 864556), south of the recent quarry (UTM 859559) and in the ANSI's northeastern corner (UTM 865565). Nationally and provincially rare species are the following:

Carex gracilescens Steudel - sedge
Castanea dentata (Marshall) Borkh. - American sweet chestnut
Crataegus dodgei Ashe - hawthorn
Desmodium rotundifolium (Michaux) DC. - prostrate tick-trefoil
Disporum lanuginosum (Michaux) Nicholson - yellow mandarin
Frasera caroliniensis Walter - American columbo
Galium pilosum Aiton - hairy bedstraw
Lechea villosa Ell. - hairy pinweed
Linum virginianum L. - Virginia yellow flax
Ludwigia polycarpa Short & Peter - many-fruited false loosestrife
Viburnum recognitum Fernald - southern arrowwood
Viola palmata L. var. **palmata** - early blue wood violet

Faunal research on the herptiles, birds and mammals within the ANSI and its

vicinity have been conducted by Furber (1980), Campbell (1977), Gartshore (1987 a, 1987 b) and McCracken (1987). Their work identified 7 amphibians, 9 reptiles, 139 birds and 26 mammals, as well as several tentative occurrences. These species generally are widespread, and several display southern and Carolinian affinites. 32 significant species are recorded, including 9 species which are nationally and provincially rare, and 24 which are regionally rare.

The Black Rat Snake, a nationally, provincially and regionally rare and threatened species is the most significant animal species here. Its population size and staus within the ANSI are not fully understood. However, there are regular sightings of adults and juveniles within the immediate vicinity. At least one winter hibernaculum has been suggested (UTM 861552), and the present size and condition of the habitat features in the area may be adequate for maintaining at least a small population.

The bird fauna of the area includes 3 nationally, provincially and regionally rare species: Red-bellied Woodpecker (summer resident which probably is breeding on the site), Yellow-breasted Chat and Orchard Oriole (no evidence of residency). There also are 2 provincially and regionally rare migrants, 18 regionally rare migrants and 4 regionally rare winter residents.

The mammal fauna of the area includes 3 nationally and provincially rare species which generally inhabit its upland forest sites: Opossum, Southern Flying Squirrel and Woodland Vole, notable population of 4 bat species, and an unconfirmed record for Gray Fox a nationally, provincially and regionally rare species. The documented significant species are as follows:

HERPTILES
- Black Rat Snake (**Elaphne obsoleta obsoleta**)

BIRDS
- Red-bellied Woodpecker (**Melanerpes carolinus**)
- Yellow-breasted Chat (**Icteria virens**)
- Orchard Oriole (**Icterus spurius**)

MAMMALS
- Opossum (**Didelphis virginiana**)
- Southern Flying Squirrel (**Glaycomys volans**)
- Woodland Vole (**Microtus pinetorum**)

9 significant areas are identified within the ANSI, and 1 in its immediate vicinity. These areas incorporate those significant vegetational, floral and faunal, and earth science features which contribute to the life science representation within the province.

PROVINCIALLY SIGNIFICANT AREAS
- Area A: Oriskany Sandstone Dry Oak - Hickory Forests
- Area B: Oriskany Sandstone Forests and Pavements
- Area C: Dry Lake Basin Ponds and Forests

REGIONALLY SIGNIFICANT AREAS
- Area D: Onondaga Escarpment and Forests
- Area E: Oriskany Sandstone Fossil Ledge
- Area F: Oriskany Sandstone and Old Quarry Dry Forest
- Area G: Old Oneida Quarry Succession
- Area H: Cayuga Limestone Pavement Dry Forest
- Area I: Oriskany Sandstone Prairie Meadows

OTHER SIGNIFICANT AREAS (outside ANSI boundary)

Area J: Nelson Onondaga Sandstone Quarry

Management considerations of particular concern are the maintenance of those vegetation communities associated with the sandstone environment, the monitoring of the significant plant and snake species, and the expansion of our understanding of the significant natural features.

1. Cooperation with land-owners and encouragement of private stewardship
2. Cutting and grazing within ANSI
3. Study of the Black Rat Snake population
4. Impact of waterfowl management on Dry Lake Basin
5. Monitoring of significant species
6. Confirmation and expansion of data base
7. Groundwater in the Dry Lake Basin and vicinity
8. Origins of low escarpment of Significant Area A
9. Mapping of Oriskany Sandstone Formation
10. Impacts of quarry development activities
11. Interpretation of Oriskany Sandstone Formation strata
12. Determination of visitor impacts on ANSI
13. Boundary modifications for Life Science ANSIs

ACKNOWLEDGEMENTS

Several people have provided invaluable contributions to this report. Their experience within the ANSI from the mid-1970s and their willingness to share their knowledge has greatly added to the perspective of its content.

The following authorities had done the initial significant research within the ANSI and provided access to their available notes and informative discussion:

Dr. P.W. Ball - Professor, Department of Botany, Erindale College, Mississauga, Ont.
G. de Boer - Planner, The City of Niagara Falls, Niagara Falls, Ont.
Dr. P.F. Maycock - Professor, Department of Botany, Erindale College, Mississauga, Ont.
Dr. R. Suffling - Professor, Faculty of Environmental Studies, University of Waterloo, Waterloo, Ont.

Interviews with the acting superintendant and watchman of the Nelson Quarry provided valuable long-term observations on certain aspects of the ANSI's ecology and land-use:

S. Banticks - Watchman, Nelson Quarry, Nelles Corners
B. Vanderburg - Superintendant, Standard Aggregates, Nelles Corners

Interviews and correspondence with additional biologists and ecologists who visited the ANSI clarified certain claims about its natural features:

D. Bradley - Biologist, Wiarton, Ont.
C.A. Campbell - Consulting Ecologist, Waterloo, Ont.
J. Kaiser - Consulting Ecologist, Mississauga, Ont.
L. Lamb - Ecologist, Faculty of Environmental Studies, University of Waterloo, Waterloo, Ont.
Dr. J.B. Phipps - Professor, Department of Plant Sciences, University of Western Ontario, London, Ont.
M.J. Oldham - Regional Ecologist, Ontario Ministry of Natural Resources, Southwestern Region, London, Ont.
Dr. A.A. Reznicek - Researcher, Herbarium, University of Michigan, Ann Arbor, Mich.
J.M. Webber (Laudenbach) - Consulting Ecologist, Mississauga, Ont.

Identifications and confirmations of vascular plant and cryptogammic collections within the ANSI were done by four authorities:

Dr. P.W. Ball - Professor, Department of Botany, Erindale College, Mississauga, Ont.
Dr. F.S. Cook - Professor, Department of Plant Sciences, University of Western Ontario, Ont.
Dr. D. Fahselt - Professor, Department of Plant Sciences, University of Western Ontario, Ont.
Dr. J.K. Morton - Professor, Department of Biology, University of Waterloo, Ont.

Ministry of Natural Resources personel provided access to file information on the ANSI, allowed use of their facilities and provided information on the Ministry's concerns about the ANSI:

L. Barbetti - Resource Liaison Officer, Ontario Ministry of Natural Resources, Niagara District, Thorold, Ont.
T.J. Beechey - Life Science Specialist, Ontario Ministry of Natural Resources, Queen's Park, Toronto, Ont.
J.Z. Fraser - Lands and Parks Supervisor, Ontario Ministry of Natural Resources, Niagara District, Thorold, Ont.
J.L. Riley - Regional Ecologist, Ontario Ministry of Natural Resources, Central Region, Richmond Hill, Ont.

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CHAPTER I: BACKGROUND INFORMATION

A. INTRODUCTION

The Oriskany Sandstone and Woodlands Area of Natural and Scientific Interest (ANSI) is located in the Regional Municipality of Haldimand - Norfolk, Town of Haldimand, about 3 km north northeast of the hamlet of Nelles Corners, or 7 km west of Cayuga (lat./long. 42° 57' N / 79° 56' W; Map-UTM 30 L/13 860560; Figures 1, 2; Map 1). Its boundaries delineate a large Life Science ANSI which generally overlaps an Earth Science ANSI at the same site (Figure 2).

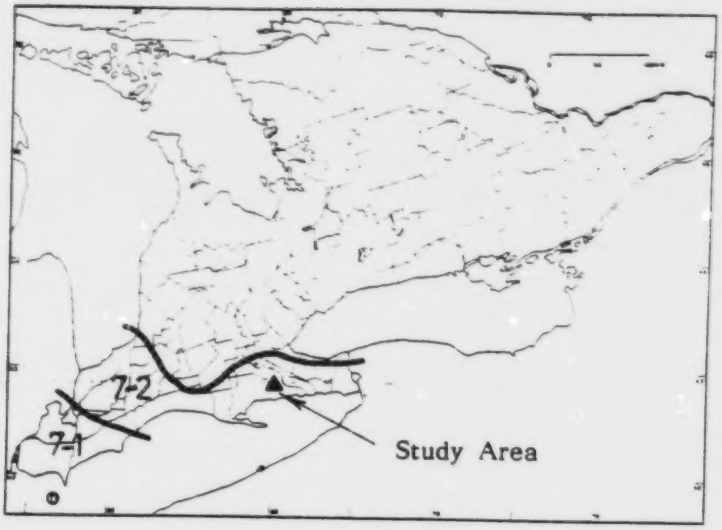
This approximately 306 ha area consists of a single large woodland with a southern arm that connects it to a wetland and pond, and includes outcrops of sandstone and limestone bedrocks. The ANSI is surrounded by croplands, and has a large, active quarry outside its southeastern boundary, while its northern portion surrounds two smaller, dormant quarries (excluded from the Life Science ANSI). Two municipal roads (Dry Lake Road, Town Line Road) intersect within the ANSI.

The ANSI is entirely under private ownership by about eight landowners. The largest of these are Nelson Aggregates Co. (Burlington) which owns most of the northern half, and Cayuga Materials and Construction (Cayuga) which owns most of the southern half. The remaining parcels are owned by local residents.

The area was first identified as having geological, vegetational and biological significance through the vegetation studies of Dr. P.F. Maycock, geological studies of Dr. C.G. Winder, and the floral and faunal studies of others, notably Dr. P.W. Ball, Dr. A.A. Reznicek and C.A. Campbell. They noted that this was the only outcrop of the Oriskany Sandstone in Ontario, that the karst landforms associated with this bedrock were of interest, that the natural vegetation represented communities which were unique in Ontario, that the flora included several nationally and provincially rare species, and that the fauna included a threatened, rare snake population.

A proposal in 1976 by the former of the Nelson Aggregates property to commence intensive development of a quarry was perceived by the above researchers as threatening the significant features.

Ontario Municipal Board hearings in 1977 / 78 provided an opportunity for the researchers to marshal their arguments against this development. However, the municipal board ruled in favour of the Flintcote Company to proceed with the quarry development with the agreement that, in order to protect the significant natural features, a suitable 'Environmental Protection Area' was to be established along the Town Line Road portion of the quarry property. A proposed environmental protection area of 19 ha was located peripherally to the quarry operation, and included features which were primarily of geological rather that vegetational significance. This area was inventoried by Dr. J.F. Alex and others in 1977 (Ecological Services for Planning), and was subsequently accepted by the Ontario Municipal Board. Development of the quarry operation proceeded between 1979 and 1982 with the clearing of an approximately 150 ha area, and excavation of a 25 ha quarry and two smaller exploratory quarries. (While the Ontario Municipal Board was convinced of the economic need for the quarry operation, it effectively ceased by 1983 due to several economic and physical reasons.)



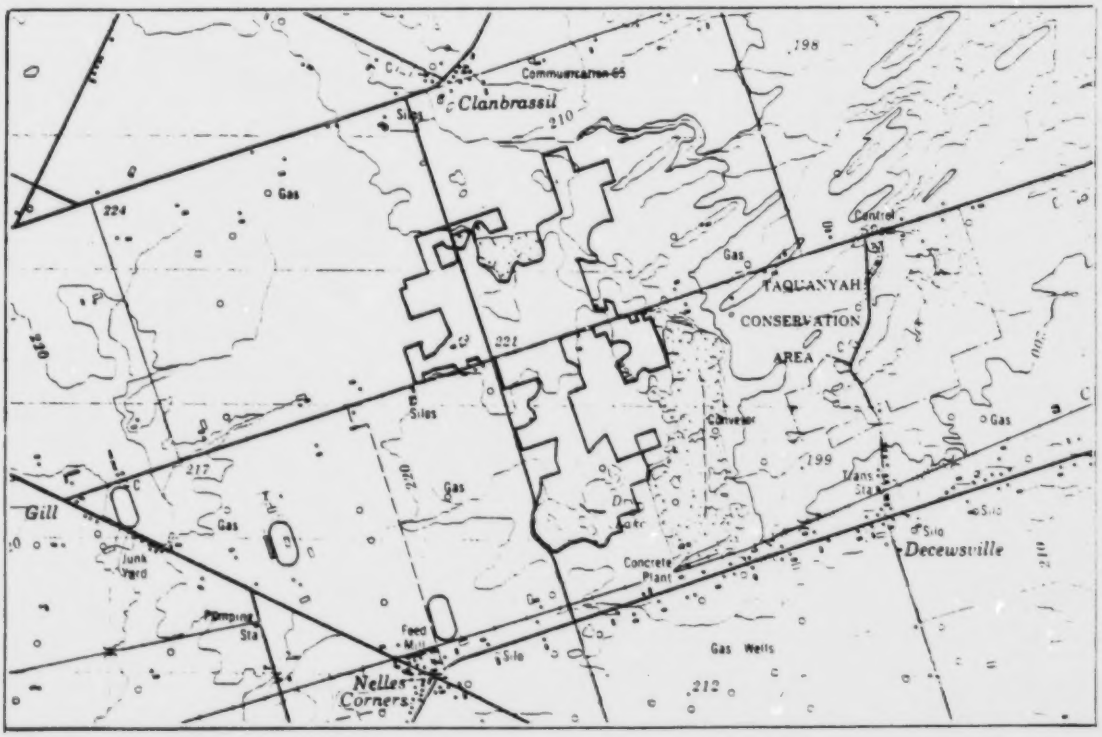


Figure 1: Provincial Location of the Oriskany Sandstone and Woodlands Area of Natural and Scientific Interest

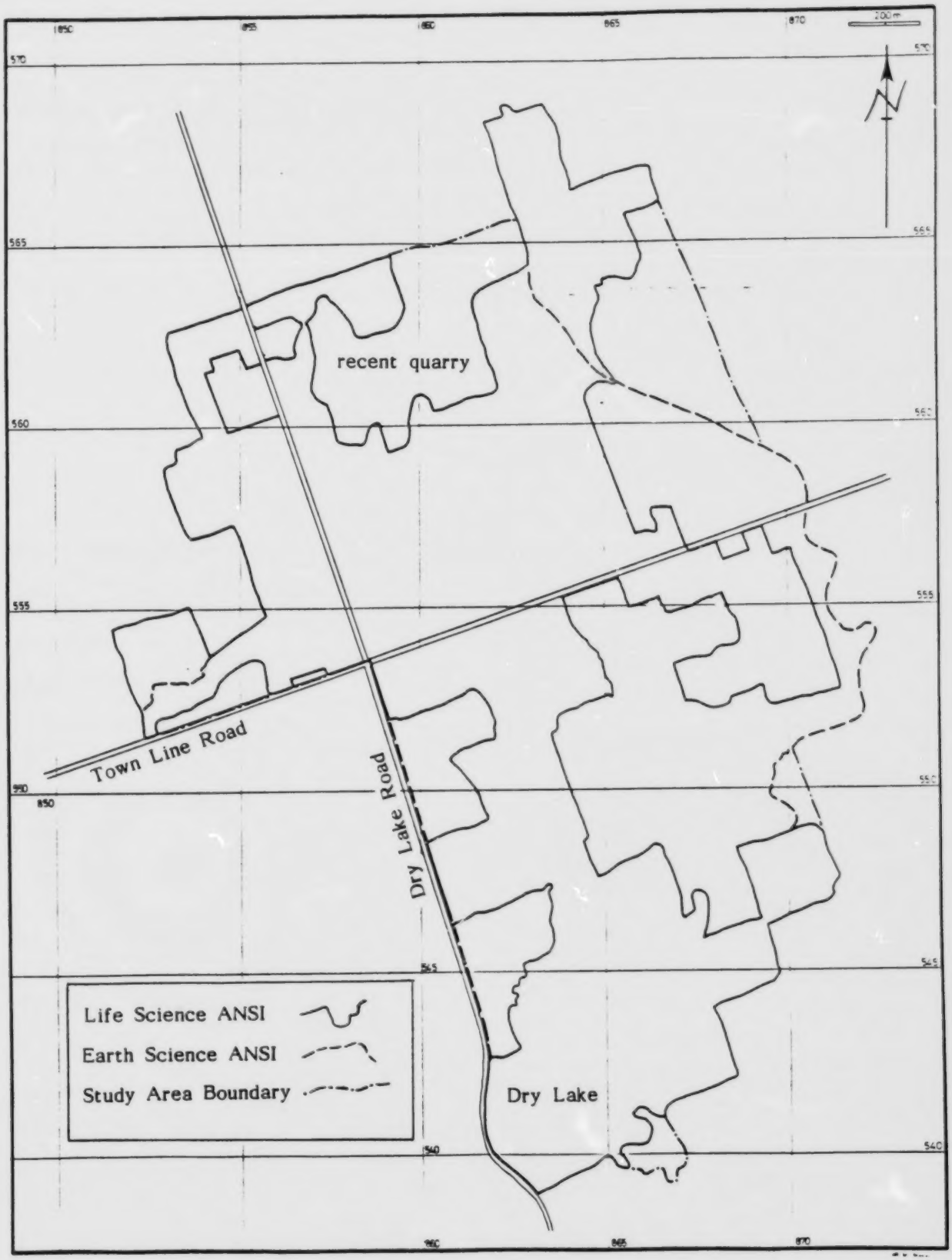


Figure 2: Boundaries of the Oriskany Sandstone and Woodlands Area of Natural and Scientific Interest

However, the original researchers maintained that the Environmental Protection Zone was inadequate to represent or protect the significant features, and continued to express their concerns through several channels, including public meetings and published scientific papers (Fahselt 1977 a, 1980; Fahselt et al. 1979).

While an appeal to the Ontario Ombudsman regarding the Ontario Municipal Board decision was pending, researchers at the Faculty of Environmental Studies of the University of Waterloo proposed that loss of species from the area might be minimized by transplantation to degraded areas nearby that could be managed for nature conservation (Suffling 1989). They received permission to conduct a feasibility study during 1980/81 (de Boer 1982, de Boer et al. 1982). However, the resulting plan was not implemented following this study because of various reasons, including general opposition from the botanical community and lack of funding.

An inventory of the significant life science features of the Haldimand Clay Plain portion of Site District 7 - 2 (Macdonald 1980) furthered the recognition of this area as having provincial significance in its representation of the region's natural features, and included the Ontario Ministry of Natural Resources' Life Science Check-sheet for the area (Beechey 1977).

This area was subsequently designated as being 'provincially significant' (Ontario Ministry of Natural Resources 1985) by the Areas of Natural and Scientific Interest (ANSI) program of the Ontario Ministry of Natural Resources.

During 1985 and 1986 the Natural Areas Inventory of the Regional Municipality of Haldimand - Norfolk conducted several brief inventories of vegetation, fauna and flora in the area (Gartshore et al. 1987 a, 1987 b). This study also recognized the significance of its natural features, designating it as one of 41 'Significant Natural Areas' for the region.

Further, the Carolinian Canada organization also identified the area as a 'Carolinian Canada Site' (1987) and indicated that "at least 66 acres [27 ha] are now protected" under a nonbinding agreement with the landowner to maintain the natural features in an undisturbed condition.

In 1986 the ministry in the Central Region contracted J. Kaiser to conduct a brief status inventory of the ANSI, and in July 1988 the author was contracted to complete a Life Science inventory for their Areas of Natural and Scientific Interest program.

B. PHYSICAL FEATURES

This area is a sandstone and limestone rockland plain, thinly overlain by loamy soils, with very little relief except for a low escarpment along its northeastern side and sand hills in its southern portions. While most of the area presents a dry, warmer than normal upland environment, two ponds and a lowland area occupy its southern arm (Figure 3).

The bedrock of the area is considered by researchers to be nationally and provincially significant (Davidson 1977). It is the only outcrop of the Oriskany Sandstone in Ontario and Canada. The Oriskany Formation is a Lower Devonian, coarse grained, light to white, massive sandstone about 7 m thick, which is characterized by its abundance of fossils, notably large brachiopods. Of the total

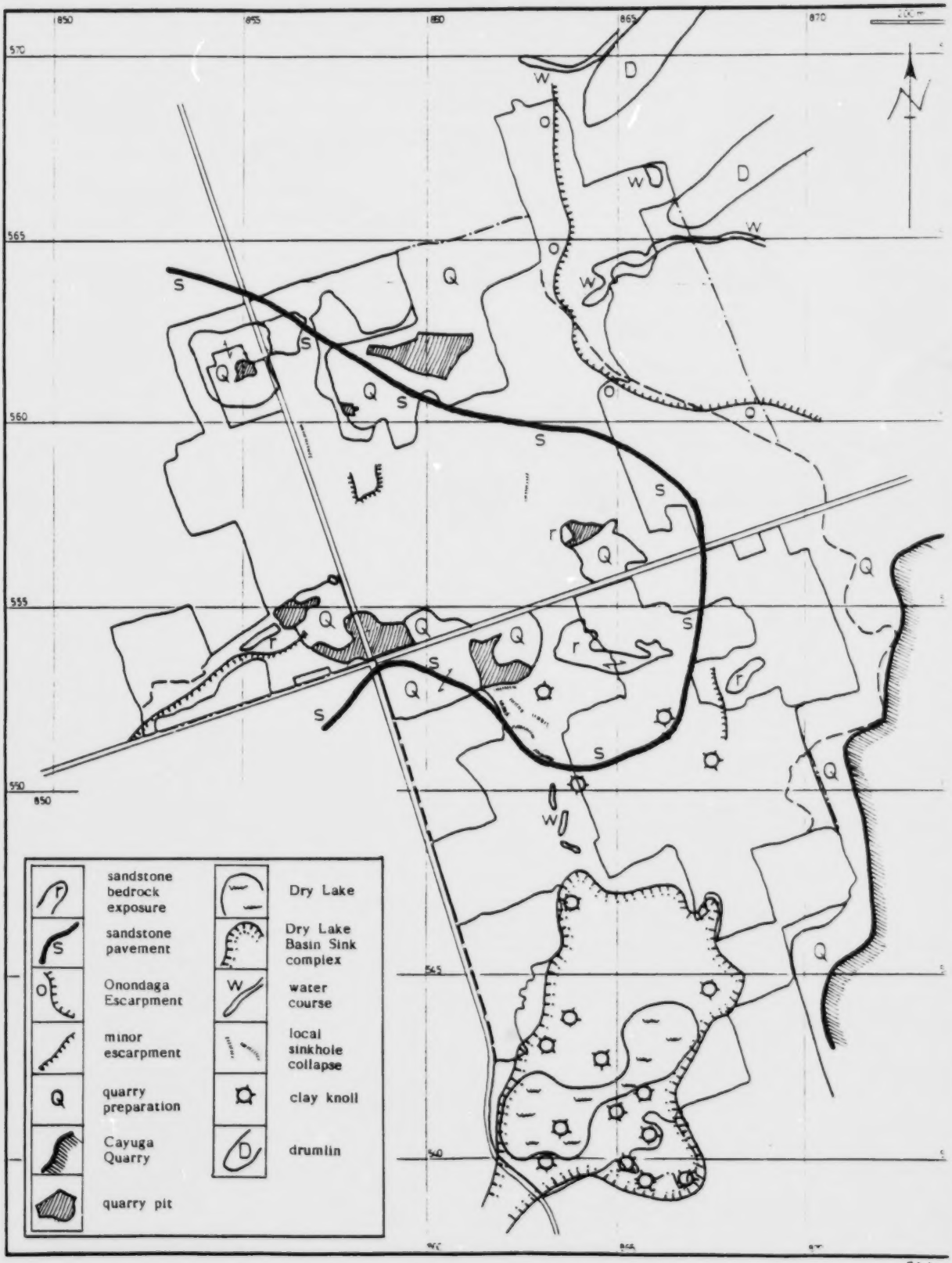


Figure 3: Physical Features of the Oriskany Sandstone and Woodlands Area of Natural and Scientific Interest

275 ha of this formation, approximately 130 ha are subsurface occurrences and 145 ha are surface occurrences, with 64 ha actually outcropping through the shallow soil. The ANSI includes over 90% of its surficial exposure and over 60% of its near subsurface exposure, where it occurs within the ANSI's central portion as a flat to very gently rolling plain. Locally in open sites, it is noticeably subject to weathering, locally leaving deposits of clean sand thinly overly the bedrock. The Oriskany is overlain by the Devonian Bois Blanc Formation, a thin to medium-bedded, cherty, fossiliferous, bioclastic or argillaceous limestone (Telford & Tarrant 1975). It appears to be exposed only very locally within the ANSI as low scarps in its northern third. The Oriskany is underlain by the Silurian Bertie Formation, a dark brown, bituminous dolostone which is exposed along the Onondaga Escarpment on the ANSI's eastern side, and in the workings of the quarries in the ANSI's central portions.

The ANSI is situated on the western edge of the Haldimand Clay Plain Physiographic Region, but shares some landform features with the Norfolk Sand Plain. The landforms within the study area are dominated by the presence of the shallow bedrock. The terrain is mostly flat to very gently rolling, with low escarpments and slopes scattered throughout the area which rarely attain an amplitude of over 3 m. However, the Onondaga Escarpment, which lies along the northeastern boundary, presents a drop of 6 m, and the low sand ridges around Dry Lake present a 4 m swell. Low-lying drumlins just touch on the northeastern-most corner of the ANSI. Davidson (1977) also indicates the occurrence of seventeen "circular knolls" of 5 m in height and 24 m in diameter which are composed of a lacustrine clay of unknown origin in the vicinity of Dry Lake. Also of interest is the presence of karst features throughout the ANSI; these are mostly shallow crevices, small cave-like entrances and collapsed bedrock pavement features which resemble small sink holes. Prior to the water control management activity by Ducks Unlimited, Dry Lake itself is reported to have periodically produced an artesian-like fountain of water in its basin following heavy percipitation (Vanderburg 1988), indicating the subsurface water activity which would be required to produce karst features.

The soils of the area are predominantly loams, classified as Farmington Loam (Ontario Agricultural College 1935), with clay loams being predominant in the northern half and sandy loams being predominant in the southern third. As well, the pH values of those overlying the Oriskany Sandstone are reported to be quite variable, ranging between 4.3 and 8.0. The sandy loam soils also have low pH values, and those which are associated with limestone have more circumneutral values (Ecological Services for Planning 1977, Fahselt et al. 1979, de Boer et al. 1982).

The shallow bedrock in much of the area make the soils very susceptible to drought and moisture stress conditions. The moisture regime of these upland sites ranges between arid and dry mesic. With deeper and more sandy soils, the uplands range between dry mesic and wet mesic. Somewhat more mesic conditions also occur where there are 'sink hole' landform features. The lowlands and wetlands of the ANSI's southern third tend to be wet to saturated. Drainage from the ANSI is poorly defined; generally, there is some surface flow to the northeast following drainage ditches and a small stream which leads toward a tributary of the Grand River. Additionally, as indicated above, there may be a significant subsurface flow following the solution features of the bedrock.

The microclimatic situation imposed by the large extent of flat, shallow bedrock allow 'warmer than normal' conditions to exist over much of the ANSI's northern two thirds. 'Normal' conditions are recognized where soils are thicker, the soils are circummesic or the terrain is more variable, such as along the escarpment.

Additionally, the regional climatic conditions generally are favourable for the growth of species which require a moderately long growing season (Table 1).

Mean Daily Temperature (min./max.) (°C)	
January	-4 (-8 / -1)
July	22 (60 / 28)
Mean Annual Frost Free Period (days)	140
Mean Duration of Snow Cover (days)	75
Mean Annual Percipitation (cm)	86.3
Mean Monthly Percipitation (cm)	
January	7.62
July	6.35
Mean Number Hours Sunshine	
January	80
April	208
July	310

Table 1: Regional Climatic Records for the Oriskany Sandstone and Woodlands Area of Natural and Scientific Interest

C. LAND USE

de Boer et al. (1982) present a brief history of land use in the ANSI and its vicinity. These lands were first surveyed by Walker in 1842 who indicated that the forest cover in the vicinity was dominated along Townline Road by eastern white pine (**Pinus strobus**), maple (**Acer** species), American beech (**Fagus grandifolia**), blue beech (**Carpinus caroliniana**) and oaks (**Quercus** species), and along the ANSI's northern portions by American basswood (**Tilia americana**), oak (**Quercus** species), eastern white pine and elm (**Ulmus** species).

Colonizing settlers arrived around 1845, and over the next 30 years they proceeded to cut the forests in order to clear homesteads and sell the lumber. By the turn of the century the forests in lots 46, 47 and 49 of North Cayuga and Oneida Townships were successional and relatively more open than at present, and some periodic selective cutting has continued until the present. However, de Boer et al. (1982) indicate that the oak - hickory forest in the vicinity of the present quarry was not seriously cut since 1900.

Agricultural activity has increased in the ANSI's vicinity over the past sixty years, opening the surrounding lands and allowing grazing within the forest communities, which perhaps maintains the openings in the succeeding forests.

Most of the woodlands of the ANSI have experienced periodic small fires since the settlement became established, but those on the northern half of the Nelson Aggregate lands do not appear to have been burned in the past half century. Small fires in the open meadow and thicket communities continue to occur periodically (Banticks 1988).

The recognition of the presence of accessible outcroppings of the Oriskany sandstone presented an opportunity for quarrying operations. A small operation along the western side of Dry Lake Road in the ANSI's northwestern quarter was underway in the mid-1800s. At the turn of the century the potential for the

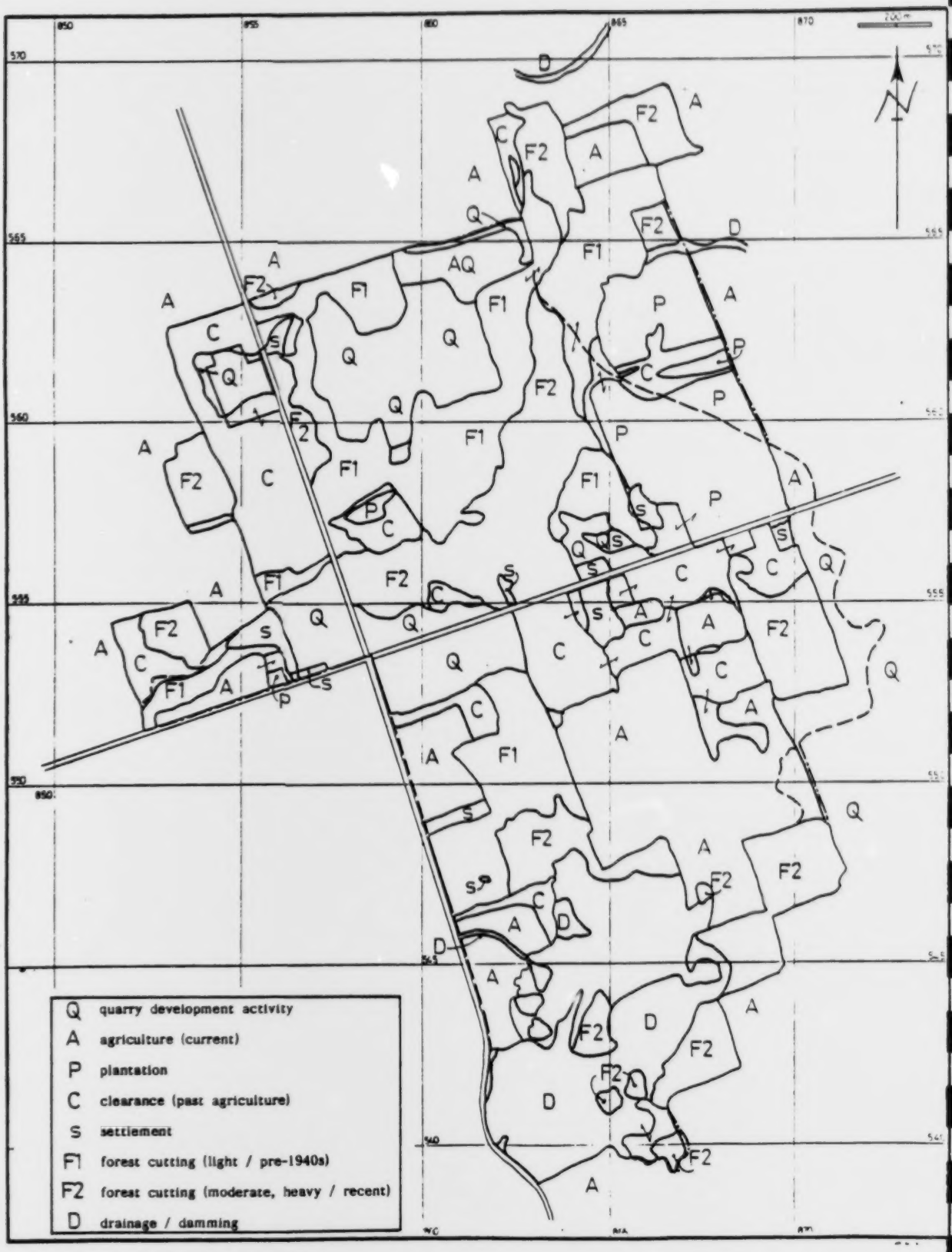

Q quarry development activity
A agriculture (current)
P plantation
C clearance (past agriculture)
S settlement
F1 forest cutting (light / pre-1940s)
F2 forest cutting (moderate, heavy / recent)
D drainage / damming

Figure 4: General Land Use and Impacts within the Oriskany Sandstone and Woodlands Area of Natural and Scientific Interest

manufacture of glass was recognized, and several quarry and glass production operations were established by Pilkington Glass, Consolidated Plate Glass and Oneida Lime Company by 1910. Relicts of the quarry operations, manufacturing buildings, workers' houses and railway roadbed are evident in the vicinity of the intersection of Townline and Dry Lake Roads (Figure 4). The recent quarry operations in the Nelson Aggregate properties included the clearance of approximately 150 ha and the excavation of a 25 ha quarry and two smaller exploratory pits.

D. REGIONAL FLORA / FAUNA

The study area's location in southwestern Ontario places it within the influence of several distinctive floristic and faunal zones. Most notable is the Carolinian Zone which presents a characteristic array of southern plant and animal species whose ranges extend from the southeastern quarter of the United States northwards, and only barely enter into Canada as a band to the north of Lake Erie which stretches between southern Lake Huron and western Lake Ontario (Fox & Soper 1952, 1953, 1954; Soper 1956, 1962). Plant species which are characteristic of the Carolinian Zone include cucumber tree (**Magnolia acuminata**), tulip tree (**Liriodendron tulipifera**), Sassafras (**Sassafras albidum**), pignut hickory (**Carya glabra**), eastern flowering dogwood (**Cornus florida**), hop tree (**Ptelea trifoliata**), wild crab apple (**Malus coronaria**) and yellow mandarin (**Disporum lanuginosum**). Charactistic fauna includes many bird species, such as Red-bellied Woodpecker (**Melanerpes carolinus**), Hooded Warbler (**Wilsonia citrina**), Yellow-breasted Chat (**Icteria virens**) and Acadian Flycatcher (**Empidonax virescens**).

There also is a presence of the more general category of southern species whose ranges extend from the eastern half of the United States into several provinces of eastern Canada, and in Ontario extend somewhat north of the Carolinian Zone. Plant species which are representative of this affinity include large-flowered white Trillium (**Trillium grandiflorum**), shagbark hickory (**Carya ovata**), white oak (**Quercus alba**), Indian cucumber (**Medeola virginiana**), wild Geranium (**Geranium maculatum**), yellow pimpernel (**Taenidia integerrima**) and blue-stemmed goldenrod (**Solidago caesia**). Birds of this affinity include Cardinal (**Richmondena cardinalis**), Eastern Wood Pewee (**Contopus virens**), Eastern Bluebird (**Sialia sialis**) and Indigo Bunting (**Passerina cyanea**). Also extending into the extreme southern portions of Ontario are faunal species which have their ranges in somewhat larger portions of the United States. These include Southern Flying Squirrel (**Glaucomys volans**), Opossum (**Didelphus virginiana**), Eastern Fox Snake (**Elaphne vulpina gloydi**) and others.

A third group of species that is evident in the flora and fauna of the region are those which are characteristic of the northern hardwood forests of the province. These have ranges which extend from the southern United States well into central Ontario, generally to between Lakes Superior and Temagami, and frequently well into the Boreal zones which extend still further northward. Plant species of this affinity include several which are widespread within the Regional Municipality of Haldimand - Norfolk, such as northern red oak (**Quercus rubra**), eastern hemlock (**Tsuga canadensis**), eastern white pine (**Pinus strobus**), beaked hazel (**Corylus cornuta**), blue-bead lily (**Clintonia borealis**), goldthread (**Coptis trifolia**) and twinflower (**Linnaea borealis**). Many of the faunal species extend into this zone, including Eastern Garter Snake (**Thamnophis sirtalis**), Northern Leopard Frog (**Rana pipiens**), American Bittern (**Botaurus lentiginosus**), American Woodcock (**Scolopax minor**), Downy Woodpecker (**Dendrocopos pubescens**), House Wren (**Troglodytes aedon**), Rose-breasted Grosbeak (**Pheucticus ludovicianus**), Red Squrrel (**Tamiascurius hudsonicus**) and White-tailed Deer (**Odocoileus virginianus**).

Other notable influences within the region include those species with affinities to the Atlantic coastal seaboard, the Great Lakes basin and the western prairies. The last affinity group is of particular interest to many researchers since prairies are thought to have been more widespread in the past, and any remnants are susceptable to disturbance. Plant species characterizing the prairie influence include Hill's oak (**Quercus ellipsoidalis**), side-oats grama (**Bouteloua curtipendula**), prairie buttercup (**Ranunculus rhomboideus**), horsemint (**Monarda puncata**) and others. Some of the faunal species may also reflect this affinity, such as Badger (**Taxidea taxus**).

E. REGIONAL VEGETATION

The Haldimand-Norfolk Region presents a variety of upland and lowland environments which support forest, thicket, meadow and aquatic communities. In most cases, these reflect the Carolinian or southern biotic affinities of the region.

Upland sites include arid to wet mesic moisture regimes on rock, sand, loam and clay substrates in warmer and normal microclimates. The drier forests are generally dominated by northern red oak (**Quercus rubra**), white oak (**Q. alba**), black oak (**Q. velutina**), shagbark hickory (**Carya ovata**), red maple (**Acer rubrum**) and eastern white pine (**Pinus strobus**), while circummesic forests are dominated generally by sugar maple (**Acer saccharum**), American beech (**Fagus grandifolia**), northern red oak (**Quercus rubra**), white ash (**Fraxinus americana**) and American basswood (**Tilia americana**). Thickets tend to be successional, and are dominated generally by gray dogwood (**Cornus foemina** subsp. **racemosa**), staghorn sumac (**Rhus typhina**), hawthorn (**Crataegus** species) or raspberry / blackberry (**Rubus** species), but also may include smooth sumac (**Rhus glabra**), prickly ash (**Zanthoxylum americanum**), flowering crab apple (**Malus coronaria**) or others. Meadows also tend to be successional, and support a host of remnant and invasive species, such as Canada blue grass (**Poa compressa**), Timothy grass (**Phleum pratense***), winter cress (**Brassica vulgaris***), field strawberry (**Fragaria virginiana**), red clover (**Trifolium pratense***), common evening primrose (**Oenothera biennis**), Canada goldenrod (**Solidago canadensis**) and arrow-leaved Aster (**Aster urophyllus**). Specific upland meadows include prairie-like communities which often include significant western and southern species, such as big bluestem (**Andropogon gerardii**), Dillen's tick-trefoil (**Desmodium paniculatum** var. **dillenii**), round-headed bush-clover (**Lespedeza capitata**), wild bergamot (**Monarda fistulosa**), northern bedstraw (**Galium boreale**), smooth Aster (**Aster laevis**) and others. Local rocklands support barrens and open meadows with an eclectic complement that includes poverty oat grass (**Danthonia spicata**), mossy stonecrop (**Sedum acre***), herb-Robert (**Geranium robertianum**) and others.

Lowland situations include wet mesic to saturated moisture regimes on sand, loam and clay substrates in normal, warmer and, occasionally, colder microclimates. The wetter forests are generally dominated by red or green ashes (**Fraxinus pennsylvanica** vars. **pennsylvanica** and **subintegerrima**), silver maple (**Acer saccharinum**), American elm (**Ulmus americana**) or black willow (**Salix nigra**), accompanied by a variety of tree species, such as black gum (**Nyssa sylvatica**), swamp white oak (**Quercus bicolor**) and black ash (**Fraxinus nigra**). Thickets are diverse and are dominated by red osier dogwood (**Cornus stolonifera**), pussy willow (**Salix discolor**), narrow-leaved meadowsweet (**Spiraea alba**), buttonbush (**Cephalanthus occidentalis**) and others. Marshes and wet meadows may be dominated by broad-leaved cattail (**Typha latifolia**), canary grass (**Phalaris arundinacea**), Canada

bluejoint (**Calamagrostis canadensis**), sedges (**Carex crinita, C. lacustris**) and others, accompanied by a host of wetland species, such as rice cut grass (**Leersia oryzoides**), wild mint (**Mentha arvensis**), Joe-Pye-weed (**Eupatorium maculatum**) and others. Only very locally are there habitat conditions which support bog communities, such as forests of black spruce (**Picea mariana**) and eastern white cedar (**Thuja occidentalis**), or heaths of leatherleaf (**Chamaedaphne calyculata**) and purple chokeberry (**Aronia prunifolia**).

Ponds, streams and other aquatic habitats have communities which include species such as pondweeds (**Potamogeton** species), water smartweed (**Polygonum amphibium**), lesser duckweed (**Lemna minor**), yellow and white pond lilies (Nuphar **variegatum, Nymphea odorata**), common bladderwort (**Utricularia vulgaris**) and others.

F. METHODS

The research within the ANSI followed established procedures (Ontarion Ministry of Natural Resources 1986). Literature and background information searches, and interviews with authorities were conducted at the initiation of the project and periodically thereafter. This concentrated on pertinent published literature, ministry and personal files (Central Region, Niagara District, Queen's Park), unpublished field notes of knowledgeable researchers (P.F. Maycock, P.W. Ball,), herbarium searches for significant cited collections (TRTE: Erindale College, WAT: University of Waterloo, TRT: Royal Ontario Museum), and interviews with knowledgeable researchers (P.W. Ball, C.A. Campbell, G. de Boer, P.F. Maycock, R. Suffling, J.M. Webber and others) and with residents of the area (B. Vanderburg, S. Banticks). This was supplemented by correspondence with additional authorities (J.K. Morton, M.J. Oldham, J.B. Phipps, A.A. Reznicek, D.A. Sutherland and others).

Field studies were conducted on the site between 9 and 22 Aug., and 1 and 4 Sept. 1988 under clear and very hot weather conditions. The study area included the present Life Science ANSI boundary and most of the Earth Science boundary (Figure 2). As well, those features immediately surrounding the ANSI were investigated, including the recent quarry development lands (about UTMs 855561 and 860652), the agricultural lands on the eastern and western sides, and the cleared quarry lands in the eastcentral section (about UTMs 871551 to 871557). Many traverses through the study area were made with the intention of passing through as many of the apparent vegetation and landform features as possible (Appendix I). 364 observations on vegetation and associated flora, fauna, landforms and impacts were recorded over the nine days of on-site survey by the author. Information recorded included physical features (terrain, aspect, geology, substrate, moisture regime, microclimate), vegetational features (community structure, closure and dominant species in tree, shrub and herb strata, successional condition), flora and fauna (general and significant species occurrence, significant species population size, condition and associated community), site disturbances and other constraints. In the case of significant or problematic species, collections were made where the populations would not be deleteriously affected (Ian D. Macdonald: #19759 to 19912, and 20039; housed at TRTE, WAT, UWO and others). A brief field trip to the area was conducted for ministry personel on 1 Sept. 1988.

Following the field phase, plant collections were determined and problematic taxa were confirmed by authorities, notably P.W. Ball and J.K. Morton. The observations recorded in the field notes were clarified and corrected where

necessary, and the vegetation and significant species occurrences were mapped. The vegetation communities were characterized and the species lists were annotated according to significance, observer and associated vegetation community.

CHAPTER II: ORISKANY SANDSTONE AND WOODLANDS

A. VEGETATION

1. INTRODUCTION

The occurrence of the sandstone outcrops in the Nelles Corners drew the attention of Dr. P.F. Maycock of the University of Toronto, Erindale College, in his studies of the southern deciduous forests (SDF) of Ontario. Such a combination of warm microclimate, dry moisture regimes and acid rockland conditions promised to support a distinctive complement of vegetation communities. By October 1976 he had selected four sites in the vicinity of the ANSI, and surveyed them using his established point quarter system over the following year. He published his preliminary findings in Fahselt et al. (1979), as follows:

Site I (SDF 168, UTM 856560) - point quarter surveys: Oct. 1976, 2 Nov. 1977

A dry, shallow-soiled, sandstone bedrock forest with no clear-cut dominants, including 28 trees species and 108 shrubs and herbs:
black oak (importance value 81) - northern red oak (48) - black cherry (43) - white oak (26) - shagbark hickory (21)

Site II (SDF 169, UTM 857558) - point quarter survey: 20 July 1977

A dry mesic, shallow-soiled, gently sloping, sandstone bedrock forest with considerable diversity, including 24 tree species and 87 herbs and shrubs:
northern red oak (86) - white oak (78) - shagbark hickory (21) - black cherry (19)

Site III (UTM 858555) - informal survey: June 1977

a Dry Mesic, more deeply-soiled, slope base, forest with 13 tree species and 45 herbs and shrubs:
white oak - shagbark hickory - black cherry

Site IV (UTM 862556) - informal survey: June 1977

A mesic, deeply-soiled forest with 12 tree species, 27 herbs and few mosses and lichens:
sugar maple - red maple - white oak - white ash - northern red oak

Dr. P.W. Ball, A.A. Reznicek and J.M. Webber (Laudenbach), fellow researchers at the University of Toronto, Erindale College, and others also conducted informal inspections of these sites during 1977, mostly from the point of view of discovering significant floral species which occurred in the habitats. They discovered an open meadow community which was rich in prairie species that extended along the western side of the opening in the oak forest (UTM 858561; P of Figure 5), and

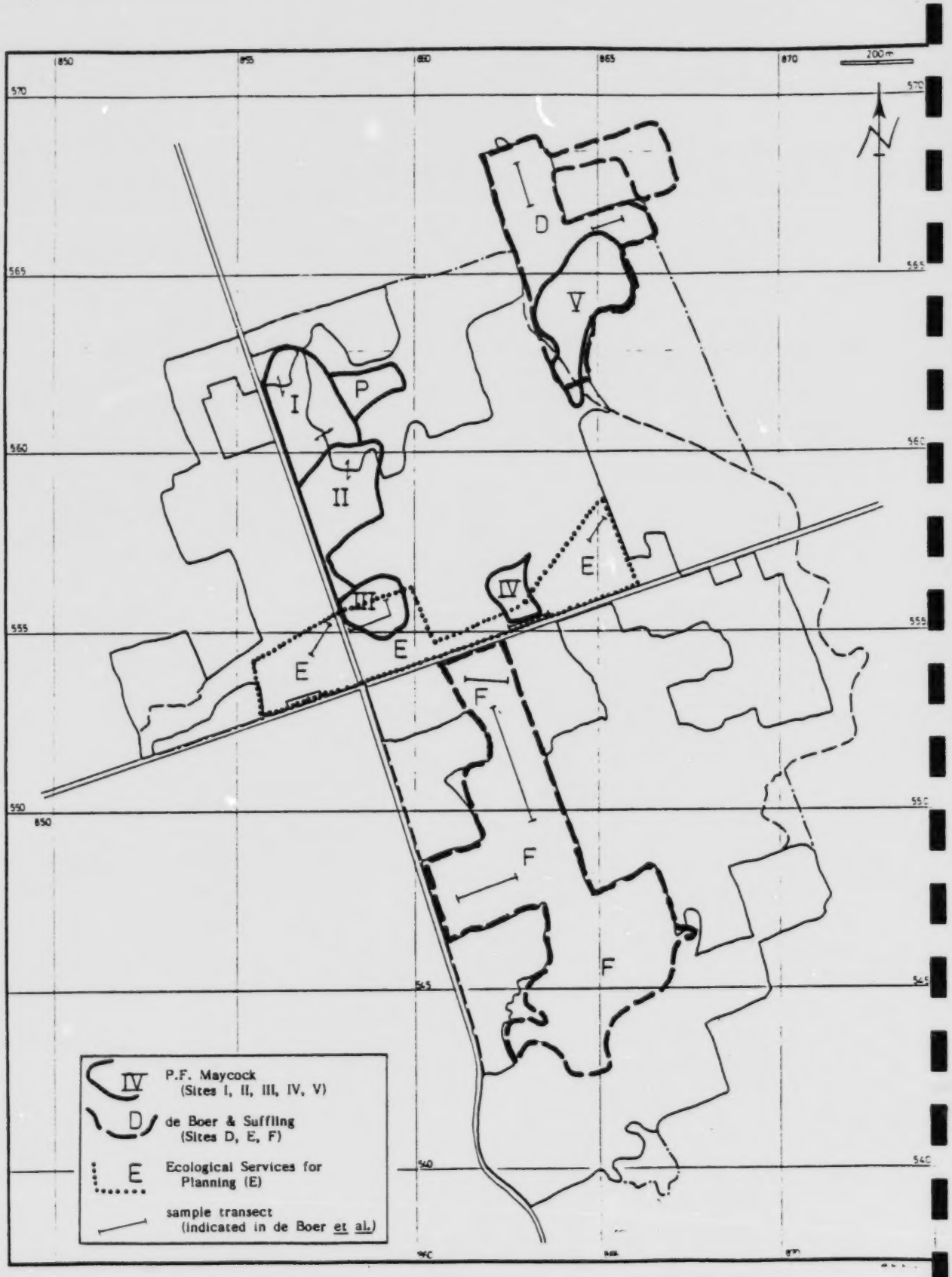


Figure 5: Vegetation Sample Sites of P.F. Maycock (1976/77), Ecological Services for Planning (1977) and de Boer et al. (1982) within the Oriskany Sandstone and Woodlands Area of Natural and Scientific Interest

examined a rich forest along the Onondaga Escarpment to the east of Maycock's sites (UTM 865565; V of Figure 5), and other areas. Maycock also inspected this prairie site in early 1977 before the general area was posted by the owner against trespassing.

Investigators for the Ontario Ministry of Natural Resources (T.J. Beechey, K.M. Lindsay and I.D. Macdonald) also conducted brief inspections of the vegetation during 1976 and 1977, mostly noting condition and potential constraints.

The controversy over the procedure of the quarry expansion within the midst of these features led the property developers to contract a survey to be conducted by independent consultant researchers. The survey of the vegetation and biota conducted by Ecological Services for Planning (1977) included Dr. J.F. Alex of the University of Guelph on its research team. This work apparently was concentrated within the proposed 'Environmental Protection Area' along the north side of Town Line Road (UTMs 856552 to 865558, Figure 5), but additional sampling was also extended onto the active Nelson quarry site and its immediate vicinity (Suffling 1989). This study apparently was conducted rather late in the 1977 growing season. In addition to sampling along 4 select transects within the protection area, general observations were made of the vegetation condition and its significances throughout the area.

A proposal by a faculty member of the School of Urban and Regional Planning at the University of Waterloo to examine the potential for transplantation of the significant plant species within the contentious area, resulted in several portions of the ANSI being surveyed by G. de Boer and Dr. R. Suffling. Three of their "Potential Reserve Sites" occur within the ANSI, and these were surveyed during 1980 along several sample transects (UTMs 856553, 860550, 861555, 862552, 862566, 865565; Figure 5), with supplementary observations being taken elsewhere in the general area during 1981. Their results were published at the completion de Boer's thesis (de Boer 1982, de Boer et al. 1982).

The Haldimand - Norfolk Natural Areas Inventory conducted brief vegetation surveys in conjunction with their faunal and floristic survey of the area during 1985 and 1986. Their description of the vegetation (Gartshore et al. 1987 a) indicates six general community complexes, echoing the findings of Maycock (Fahselt et al. 1979).

J. Kaiser conducted a very brief inspection of the ANSI in 1986 for the Ministry of Natural Resources, and summarized the vegetation according to the ministry's fine forestry standards.

I.D. Macdonald conducted an inventory of the vegetation over a 9 day period, covering representative portions of the ANSI's landforms and associated communities. 63 community patterns were recorded under several groupings which reflect their ecological requirements, community structure and origins (Table 2; see Methods). The findings of previous researchers were incorporated into his findings where appropriate. These are discussed below, and are mapped in Figure 6 and Map 1.

2. GENERAL VEGETATION DESCRIPTION

The vegetation of the Oriskany Sandstone and Woodlands ANSI includes a variety of dry and mesic upland and wet lowland deciduous forests, a large pond and wetland complex, and successional barrens, meadows and thickets (Figure 6).

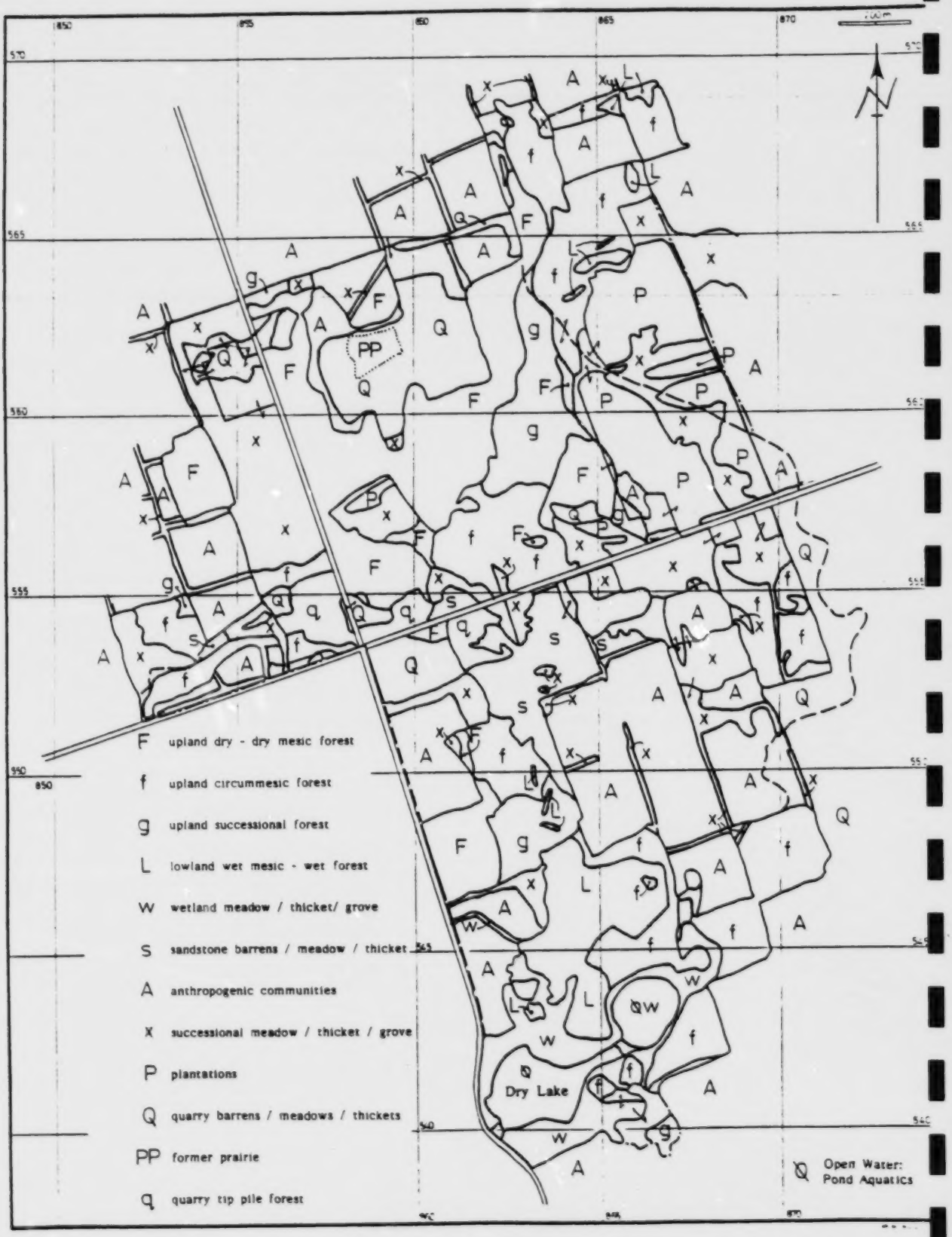

F upland dry - dry mesic forest
f upland circummesic forest
g upland successional forest
L lowland wet mesic - wet forest
W wetland meadow / thicket/ grove
S sandstone barrens / meadow / thicket
A anthropogenic communities
X successional meadow / thicket / grove
P plantations
Q quarry barrens / meadows / thickets
PP former prairie
q quarry tip pile forest
Dry Lake
Open Water: Pond Aquatics

Figure 6: General Vegetation Communities of the Oriskany Sandstone and Woodlands Area of Natural and Scientific Interest

The dry to dry mesic upland forests (communities F-0, F-1, F-2, F-3, F-4, F-5) are dominated by northern red oak (**Quercus rubra**), white oak (**Q. alba**) and shagbark hickory (**Carya ovata**), with codominants or subdominants of red maple (**Acer rubrum**), black cherry (**Prunus serotina**), bitternut hickory (**Carya cordiformis**) and black oak (**Quercus velutina**), and local occurrences of Chinquapin oak (**Q. muehlenbergii**), eastern white pine (**Pinus strobus**), trembling aspen (**Populus tremuloides**) and others. The shrub cover includes saplings of red choke cherry (**Prunus virginiana**), smooth Juneberry (**Amelanchier laevis**), gray dogwood (**Cornus foemina** subsp. **racemosa**), downy arrowwood (**Viburnum rafinesquianum**) and witch-hazel (**Hamamelis virginiana**), and saplings of the tree species. The herb cover includes eastern bracken fern (**Pteridium aquilinum**), rough-leaved mountain rice (**Oryzopsis asperifolia**), sedge (**Carex pensylvanica**), wild lily-of-the-valley (**Maianthemum canadense**), wild Geranium (**Geranium maculatum**), downy yellow violet (**Viola pubescens** var. **pubescens**), white wild licorice (**Galium circaezans**), arrow-leaved Aster (**Aster urophyllus**), blue-stemmed goldenrod (**Solidago caesia**) and others. Of significance within these forests are very dry to dry openings which support a variety of nationally and provincially rare, and regionally rare or very uncommon species, such as panicled tick-trefoil (**Desmodium paniculatum** var. **paniculatum**), prostrate tick-trefoil (**D. rotundifolium**), long-bracted tick-trefoil (**D. cuspidatum**), Virginia mountain mint (**Pycnanthemum virginianum**), hairy beard-tongue (**Penstemon hirsutus**), hairy bedstraw (**Galium pilosum**) and others. These forests are most common in the northern half of the ANSI (Figure 6), but also occur in the southern arm.

The circummesic upland forest communities (F-9, F-11, F-12) are dominated by sugar maple (**Acer saccharum**, particularly where there is maple syrup management), northern red oak (**Quercus rubra**) and white ash (**Fraxinus americana**), accompanied by American beech (**Fagus grandifolia**), American basswood (**Tilia americana**), black cherry (**Prunus serotina**), white oak (**Quercus alba**), bitternut hickory (**Carya cordiformis**) and others. The shrub cover is often quite open, and includes saplings of the trees, ironwood (**Ostrya virginiana**), red choke cherry (**Prunus virginiana**), maple-leaved Viburnum (**Viburnum acerifolium**), smooth Juneberry (**Amelanchier laevis**), downy glaucous honeysuckle (**Lonicera dioica** var. **orientalis**), red-berried elder (**Sambucus pubens**) and others. The herb cover may be very open to closed, and includes a wide variety of species, such as spinulose woodfern (**Dryopteris carthusiana**), grasses (**Festuca obtusa, Poa alsodes**), sedges (**Carex blanda, C. pedunculata, C. pensylvanica**), wild lily-of-the-valley (**Maianthemum canadense**), tall false Solomon's-seal (**Smilacina racemosa**), large-flowered white Trillium (**Trillium grandiflorum**), white avens (**Geum canadense**), wild Geranium (**Geranium maculatum**), running strawberry-bush (**Euonymus obovatus**), wooly blue violet (**Viola sororia**), common enchanter's nightshade (**Circaea lutetiana**), sweet cicely (**Sanicula claytonii**), blue Phlox (**Phlox divaricata**), white wild licorice (**Galium circaezans**), large-leaved Aster (**Aster macrophyllus**), blue-stemmed goldenrod (**Solidago caesia**) and others. Nationally, provincially and regionally significant species associated with this community include sedge (**Carex gracilescens**), yellow mandarin (**Disporum lanuginosum**), early blue wood violet (**Viola palmata** var. **palmata**) and American columbo (**Frasera caroliniensis**) and several others. These forests occur on the better-drained soils around the Dry Lake Basin at the ANSI's southern end, along the northern side of the Town Line Road, and at the base of the Onondaga escarpment in the ANSI's northeastern corner (Figure 6).

There has been intensive cutting locally in the northern portions of the dry and circummesic upland forests, and parts of those sites sampled by Maycock (Fahselt et al. 1979) have been cut and cleared through the quarry expansion activities and through continued select cutting and timber production management. The resulting communities (F-6, F-7, F-8, F-10, F-13) retain a wide variety of the original species, but also include successional features. The tree cover includes northern

red oak (**Quercus rubra**), white oak (**Q. alba**), red maple (**Acer rubrum**), sugar maple (**A. saccharum**), shagbark hickory (**Carya ovata**), white ash (**Fraxinus americana**), paper birch (**Betula papyrifera**), large-toothed aspen (**Populus grandidentata**), trembling aspen (**P. tremuloides**) and others. The shrub cover includes, in addition to an often profuse regrowth of the tree species, commonly as suckers, the other forest shrub species, as well as invasive shrubs, such as common blackberry (**Rubus allegheniesis**), the common red and black raspberries (**R. idaeus** var. **strigosus, R. occidentalis**), hawthorns (**Crataegus** species) and prickly ash (**Zanthoxylum americanum**). The herb cover is similar in including an 'explosion' of the former forest species along with various invasive elements, such as Canada and Kentucky blue grasses (**Poa compressa, P. pratensis**), field strawberry (**Fragaria virginiana**), herb-Robert (**Geranium robertianum**), common speedwell (**Veronica officinalis**), heal-all (**Prunella vulgaris** var. **lanceolatum**) and Canada goldenrod (**Solidago canadensis**). Regionally rare species occurring here include the native shrubs: Pennsylvania raspberry (**Rubus pensilvanicus**), and hawthorn (**Crataegus holmesiana**).

The wet, lowland forest communities (L-1, L-2, L-3, L-4, L-g, W-g) occur mostly in the southern arm of the ANSI as a large feature associated with the Dry Lake Basin, but they also elsewhere in smaller depressions and around the slough basins. They are generally dominated by silver maple (**Acer saccharinum**) and green ash (**Fraxinus pennsylvanica** var. **subintegerrima**), and include white elm (**Ulmus americana**), swamp white oak (**Quercus bicolor**), willows (**Salix nigra, S. fragilis**), black ash (**Fraxinus nigra**), red maple (**Acer rubrum**) and others. The shrub cover is quite variable and may include gray dogwood (**Cornus foemina** subsp. **racemosa**), winterberry (**Ilex verticillata**), nannyberry (**Viburnum lentago**), narrow-leaved meadowsweet (**Spiraea alba**) and others. The herb cover may vary from being very open in flooded swamps to very closed in open situations, and includes sensitive fern (**Onoclea sensibilis**), fowl manna grass (**Glyceria striata**), rice cut grass (**Leersia oryzoides**), sedges (**Carex intumescens, C. lacustris**), false nettle (**Boehmeria cylindrica**), bristly crowfoot (**Ranunculus pensylvanicus**), northern bugleweed (**Lycopus uniflorus**), deadly nightshade (**Solanum dulcamara***),[1] leafy beggar's-ticks (**Bidens frondosa**), calico Aster (**Aster lateriflorus**) and others. Nationally, provincially and regionally significant species associated with these lowland forests include southern arrowwood (**Viburnum recognitum**) and water pimpernel (**Samolus parviflorus**).

The vegetation communities associated with the pond and wetlands of the Dry Lake basin at the ANSI's southern end, and with the several smaller sloughs and depressions elsewhere within the ANSI, include aquatics, marshes and thicket swamps. The aquatic community (W-a) is not well-developed and includes only a few species, such as pondweeds (**Potamogeton** species). The wet meadows include an emergent community (W-e) with giant burreed (**Sparganium eurycarpum**), broad-leaved arrowhead (**Sagittaria latifolia**), golden nut-grass (**Cyperus esculentus**) and Pennsylvania smartweed (**Polygonum pensylvanicum** var. **laevigatum**), and often extensive grassy or forb meadows of reed canary grass (**Phalaris arundinacea**), rice cut grass (**Leersia oryzoides**), sedges (**Carex crinita, C. lacustris**) and cocklebur (**Xanthium strumarium**). The wetland thickets include swamp fringe communities (L-t, W-t) of red-osier dogwood (**Cornus stolonifera**), willows (**Salix discolor, S. petiolaris**) and highbush cranberry (**Viburnum trilobum**), and often densely growing, tall thickets (L-b) of buttonbush (**Cephalanthus occidentalis**). Nationally, provincially and regionally significant species associated with these communities include green-fruited burreed (**Sparganium chlorocarpum**), many-fruited false loosestrife (**Ludwigia polycarpa**) and others.

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1. Note that non-native, invasive or intentionally planted species shall be indicated with an asterisk (*) throughout the text of this chapter.

About half of the surface area of the ANSI's study area has been severely disturbed over the past century and now supports successional barrens, meadow and thicket communities. Indeed, well over a third of the ANSI's communities are upland successional in nature. The quarrying activities have created a distinctive series of recent and older communities which have developed on the bared bedrock, berms or tip heaps. Meadows and barrens communities (Q-o, Q-x, Q-q, Q-m, Q-w) include successional species, such as yellow foxtail (**Setaria glauca***), black medick (**Medicago lupulina***), Queen Anne's lace (**Daucus carota***), yarrow (**Achillea millefolium***), robin's plantain (**Erigeron pulchellus**) and others. Thicket and grove communities (Q-t, Q-g, Q-d) have succeeded along the fringes of the quarries and onto their berms, with trembling aspen (**Populus tremuloides**), gray dogwood (**Cornus foemina** subsp. **racemosa**) and wild red raspberry (**Rubus idaeus** var. **strigosus**) being typical of their cover. Of interest, lying to the northwest of the intersection of Town Line and Dry Lake Roads, is an older forest which has developed on the century-old quarry spoil heaps (Q-f). This has a very eclectic tree cover of sugar maple (**Acer saccharum**), northern red oak (**Quercus rubra**), black cherry (**Prunus serotina**), large-toothed aspen (**Populus grandidentata**), white ash (**Fraxinus americana**), black walnut (**Juglans nigra**), eastern white pine (**Pinus strobus**) and many others - a mixture of past plantings and natural succession that is impossible to map. Even these disturbed sites include regionally significant species, such as sicklepod (**Arabis canadensis**), Pennsylvania raspberry (**Rubus pensilvanicus**), Kalm's brome grass (**Bromus kalmii**), Venus' looking-glass (**Triodanis perfoliata**) and others.

More significant than these quarry scrapings, however, are the naturally occurring exposures of sandstone which are situated in several localities off Town Line Road, with a particularly large outcrop in an open field about UTM 864553. These generally have been disturbed by grazing and past trampling, but support barrens, meadow and thicket communities (S-o, S-m, S-t) which have a distinctive flora that includes Bicknell's cranesbill (**Geranium bicknellii**), early saxifrage (**Saxifraga virginiensis**), common hair grass (**Deschampsia flexuosa**, a more northerly occurring species), smooth sumac (**Rhus glabra**) and other regionally significant species. Additionally, there are several low escarpments in the ANSI which support a distinctive vegetation of mosses and ferns (S-e), such as that of the fossil-rich ledges at UTM 854552 which have marginal woodfern (Dryopteris marginalis), common polypody (**Polypodium virginianum**) and Mackay's fragile fern (**Cystopteris tenuis**).

Communities which have derived from active, 'anthropogenic' disturbances occur throughout the ANSI, such as croplands, roadsides, pastures, lawns, farmyards and ditches (A-c, A-r, A-p, A-l, A-f, A-w). These communities host many early successional, invasive and introduced species which generally are common in the region; however, also included are several Regionally Significant species, such as beggar's-lice (**Hackelia virginiana**, rare in the Haldimand Clay Plain) and the non-native dwarf spurge (**Euphorbia exigua***).

Communities which are not as persistantly disturbed, and which have a community structure which is succeeding toward stability, occur throughout the ANSI as old field meadows, thickets and groves (X-m, X-s, X-l, X-t, X-g, X-h). These generally have the expected complement of invasive species, such as Timothy grass (**Phleum pratense***), ox-eye daisy (**Leucanthemum vulgare***), New England Aster (**Virgulus novae-angliae**), Canada goldenrod (**Solidago canadensis**), gray dogwood (**Cornus foemina** subsp. **racemosa**), hawthorn (**Crataegus** species) and trembling aspen (**Populus tremuloides**). As well, there are overplantings of pines (**Pinus strobus***, **P. resinosa***), spruce (**Picea glauca***) and black walnut (**Juglans nigra***) in plantation communities (P-x, P-p, P-d). However, there are certain communities which are of interest due to their species, such as the invasive forests (X-f) which

include the regionally significant Chinquapin oak (**Quercus muehlenbergii**), and possibly a hybrid oak (**Q. alba** X **Q. macrocarpa**). Of particular interest are several small meadows in the northwestern quarter of the ANSI which have remnant prairie species in their complements (X-p), such as round-headed bush-clover (**Lespedeza capitata**), wand-like bush-clover (**L. intermedia**), panicled tick-trefoil (**Desmodium paniculatum** var. **paniculatum**), Siberian dogbane (**Apocynum sibiricum** var. **cordiferum**), wild bergamot (**Monarda fistulosa**) and gray goldenrod (**Solidago nemoralis**). Indeed, Maycock and Ball documented a large expanse of rich prairie (PP) in the vicinity of the recent quarry expansion area (UTM 858561) which supported a complement of 45 species, 10 of which are nationally, provincially or regionally significant, and over 30 of which are representative prairie species. Notable among these are smooth sumac (**Rhus glabra**), prostrate tick-trefoil (**Desmodium rotundifolium**), hairy bedstraw (**Galium pilosum**), Virginia yellow flax (**Linum virginianum**), big bluestem (**Andropogon gerardii**), prairie cinquefoil (**Potentilla arguta**) and early blue wood violet (**Viola palmata** var. **palmata**).

3. COMMUNITY DESCRIPTIONS

The studies of the vegetation of the Oriskany Sandstone and Woodlands ANSI (Macdonald 1988) identified 63 community patterns associated with 9 environmental, successional or community structural classes. Each of these is briefly described below in order of increasing moisture. They are listed in Table 2 and mapped in Map 1. Their site type matrix appears as Figure 7. Their component species are outlined in the text, and Appendix A indicates those communities inhabited by each species.

S SANDSTONE PAVEMENT COMMUNITIES

The naturally occurring outcrops of the Oriskany Sandstone Formation within the ANSI support 4 xeric communities. These are in several locations, with a notable expanse of exposure to the southeast of the intersection of Dry Lake and Town Line Roads (UTMs 862553 to 864553), with smaller features occurring elsewhere (UTMs 854552, 858554, 860554, 863557; Map 1). Included are those outcroppings which support a characteristic native flora, and form communities which appear to have retained at least some of their original native species, and which have succeeded along natural lines. While they generally are disturbed by grazing, farm vehicle traffic and some activities associated with past quarrying, the presence of this 'natural' element readily distinguishes them from those of the Quarry Communities (see below). In essence, they are the only existing remnants of the former open bedrock communities, and, while these communities cover only 10.56 ha., or 1.35% of the ANSI's total surface area, this still consititutes most the remnant outcrop features of the rockland formation in the study area.

S-o Arid - Very Dry: Sandstone Pavement Barrens

This small (4.13 ha.) community occurs as a very open to semiopen herb cover on exposed to very shallow-soiled sandstone, with only very scattered tree and shrub species. Its acidic rockland substrate, warmer microclimate and arid to very dry moisture regimes creates a xeric environment which probably excludes many

Table 2: Vegetation Communities of the Oriskany Sandstone and Woodlands Area of Natural and Scientific Interest (3 pages)

		SITE TYPES			% AREA	SURFACE AREA (ha)
	SANDSTONE PAVEMENT COMMUNITIES				3.45%	10.56
S-o	Arid - Very Dry: Sandstone Pavement Barrens	H	A-VD	R	1.35%	4.13
S-e	Arid - Dry: Sandstone Escarpment Face	HN	A-D	R	0.02%	0.06
S-m	Very Dry: Sandstone Pavement Meadow	H	VD	R	1.52%	4.65
S-t	Very Dry - Dry: Sandstone Pavement Thicket	H	VD-D	R	0.56%	1.71
	QUARRY COMMUNITIES				5.18%	15.85
Q-o	Arid: Recent Scraped Bedrock Pavement Preparation Barrens	HN	A	R	0.49%	3.09
Q-x	Arid - Very Dry: Old Scraped Bedrock Pavement Preparation Barrens / Meadow	NH	A-VD	R	0.73%	4.59
Q-q	Arid - Very Dry: Quarry Basin Barrens / Meadow Complex	H	A-VD	R	--	0
Q-t	Very Dry - Dry Mesic: Quarry Basin Thicket / Meadow Complex	VD-DM	H	R	0.24%	1.50
Q-g	Dry: Quarry Basin Grove	H	D	R	0.37%	2.33
Q-m	Dry - Dry Mesic: Quarry Berm Meadow / Scattered Shrubs	H	D-DM	L	0.32%	2.02
Q-d	Dry Mesic: Quarry Berm / Tip Pile Thicket / Grove	HN	DM	L	--	0
Q-f	Dry Mesic - Mesic: Quarry Tip Pile Forest Complex	H	DM-M	L	3.18%	20.07
Q-w	Wet Mesic - Very Wet: Quarry Wet Meadow / Thicket Complex	H	WM-VW	R	0.10%	0.61
	ANTHROPOGENIC COMMUNITIES				0.98%	3.00
A-r	Arid - Dry: Roadside Clearance Meadow	NH	A-D	S	0.98%	3.00
A-p	Very Dry - Dry: Pasture Meadow	NH	VD-D	L	--	0
A-f	Very Dry - Dry: Farmyard Barrens	N	VD-D	L	--	0
A-l	Dry - Dry Mesic: Lawn	HN	D-DM	L	--	0
A-c	Dry - Dry Mesic: Cropland and Margin	N	D-DM	L	--	0
A-w	Wet - Saturated: Dugout Pond Meadow	N	W-S	L	--	0
	SUCCESSIONAL COMMUNITIES					
X-m	Very Dry - Dry: Old Field Open Meadow	NH	A-D	L	10.88%	54.64
X-p	Very Dry - Dry: Old Field Prairie Inclusions	NH	VD-D	L	1.22%	33.30
X-s	Dry: Old Field Meadow / Thicket Succession	NH	D	L	0.37%	1.13
X-l	Dry: Old Field Low Thicket	NH	D	L	0.61%	1.87

(Table 2: continued)

X-t	Dry: Old Field Tall Thicket	NH	D	L	1.47%	4.50
X-g	Dry - Dry Mesic: Successional Grove Poplar	NH	D-DM	L	0.81%	2.48
X-f	Dry - Dry Mesic: Successional Grove Mixed Trees	HN	D-DM	L	0.78%	2.39
X-h	Dry - Dry Mesic: Hedge Row Grove / Thicket	NH	D-DM	L	0.83%	2.54
X-c	Dry Mesic - Mesic: Forest Clearcut	NH	DM-M	L	0.76%	2.33
X-w	Wet Mesic - Wet: Drainage Ditch Meadow / Thicket	N	WM-W	L	--	0
X-d	Wet Mesic - Very Wet: Wetland Berm of Dam and Ditch	N	WM-VW	L	0.12%	0.37
	PLANTATIONS				1.44%	4.41
P-x	Dry - Dry Mesic: Young Coniferous Plantation	NH	D-DM	L	0.24%	0.73
P-p	Dry - Dry Mesic: Older Coniferous Plantation	NH	D-DM	L	1.10%	3.37
P-d	Dry Mesic- Mesic: Older Deciduous Plantation	N	DM-M	L	0.10%	0.31
	PRAIRIE COMMUNITY				--	0
PP	Very Dry - Dry: Prairie Meadow	H	VD-D	L	--	0
	UPLAND FOREST COMMUNITIES				59.5%	182.07
F-0	(Very Dry) - Dry: Oak Opening	HN	(VD)-D	L	0.81%	2.48
F-1	Dry: Forest Red Oak - White Oak - Shagbark Hickory	HN	D	L(R)	17.12%	52.39
F-2	Dry: Disturbed Forest Red Oak - White Oak - Trembling Aspen - Shagbark Hickory - Black Cherry	H	D	LR	1.22%	3.73
F-3	Dry - Dry Mesic: Forest Red Oak - Bitternut Hickory - Eastern White Pine - Chinquapin Oak - Red Maple - White Oak	HN	D-DM	RL	1.05%	3.21
F-4	Dry - Mesic: Sink Hole Mosaic Forest Red Oak - White Oak - Red Maple - Sugar Maple - Black Cherry - Large-toothed Aspen - American Beech	NH	D-M	RL	1.22%	3.73
F-5	Dry Mesic: Forest Red Oak - White Oak - Sugar Maple	HN	DM	L	3.50%	10.71
F-6	Dry Mesic: Successional Forest Complex Sugar Maple - Red Oak - White Oak - Shagbark Hickory - White Ash - Large-toothed Aspen	NH	DM	LR	4.90%	15.0
F-7	Dry Mesic (- Mesic): Successional Forest Red Oak - Sugar Maple - Bitternut Hickory - Shagbark Hickory - White Ash	N	DM(-M)	RL	1.05%	3.21
F-8	Dry Mesic (- Mesic): Successional Forest Bigtooth Aspen - Red Oak - Red Maple - Shagbark Hickory - White Oak	NH	DM(-M)	L	2.23%	6.82

(Table 2: continued)

F-9	Dry Mesic - Mesic: Forest Red Maple - Red Oak - White Oak - Sugar Maple - American Beech - Shagbark Hickory - Bitternut Hickory - Eastern White Pine	N	DM-M	L	2.45%	7.50
F-10	Dry Mesic - Mesic: Successional Forest Sugar Maple - Bitternut Hickory - White Ash	NH	DM-M	L	1.03%	3.15
F-11	Mesic: Forest Sugar Maple - Red Oak - White Ash - American Beech	N	M	L	11.99%	36.67
F-12	Mesic: Managed Forest Sugar Maple - (Red Ash - White Ash)	N	M	L	8.83%	27.02
F-13	Dry Mesic - Wet Mesic: Successional Forest Complex Bitternut Hickory - Shagbark Hickory - White Oak - White Ash - Hawthorn	N	DM-WM	L	2.13%	6.52
	LOWLAND COMMUNITIES				8.17%	25.0
L-1	Wet Mesic: Disturbed Lowland Forest Green Ash - Shagbark Hickory - Swamp White Oak - Red Maple - Trembling Aspen	N	WM	L	1.79%	5.48
L-g	Wet Mesic - Wet: Slough Fringe Grove Silver Maple - Green Ash - Swamp White Oak - White Elm - Willow	N	WM-W	L	0.37	1.13
L-2	Wet: Swamp Forest Silver Maple - Green Ash - White Elm - Swamp White Oak	N	W	L	4.65%	14.23
L-3	Wet: Successional Swamp Forest Green Ash	N	W	L	0.24%	0.73
L-4	Wet: Spring Swamp Forest Inclusion Silver Maple - Green Ash	N	W	L	0.22%	0.67
L-m	Wet: Slough Fringe Marsh Meadow	N	W	L	0.02%	0.06
L-t	Wet - Very Wet: Slough Fringe Thicket	N	W-VW	L	0.05%	0.15
L-b	Very Wet - Saturated: Slough Thicket Buttonbush	N	VW-S	L	0.83%	5.23
	BASIN WETLAND COMMUNITIES				10.39%	31.8
W-g	Wet Mesic - Wet: Wetland Basin Fringe Grove	N	WM-W	L	1.30%	3.98
W-f	Wet Mesic- Wet: Forb Marsh Meadow	N	WM-W	L	0.17%	0.52
W-m	Wet Mesic - Wet: Tall Graminoid Marsh Meadow	N	WM-W	L	2.98%	9.12
W-w	Wet: Pond Fringe Drawdown Meadow	N	W	L	2.27%	6.94
W-t	Wet - Very Wet: Wetland Basin Fringe Thicket	N	W-VW	L	1.00%	3.06
W-e	Very Wet - Saturated: Pond Emergent Graminoid Marsh	N	VW-S	L	2.27%	0.21
W-a	Open Water: Pond Aquatics	N	O	L	2.59%	7.96
					100.00%	306

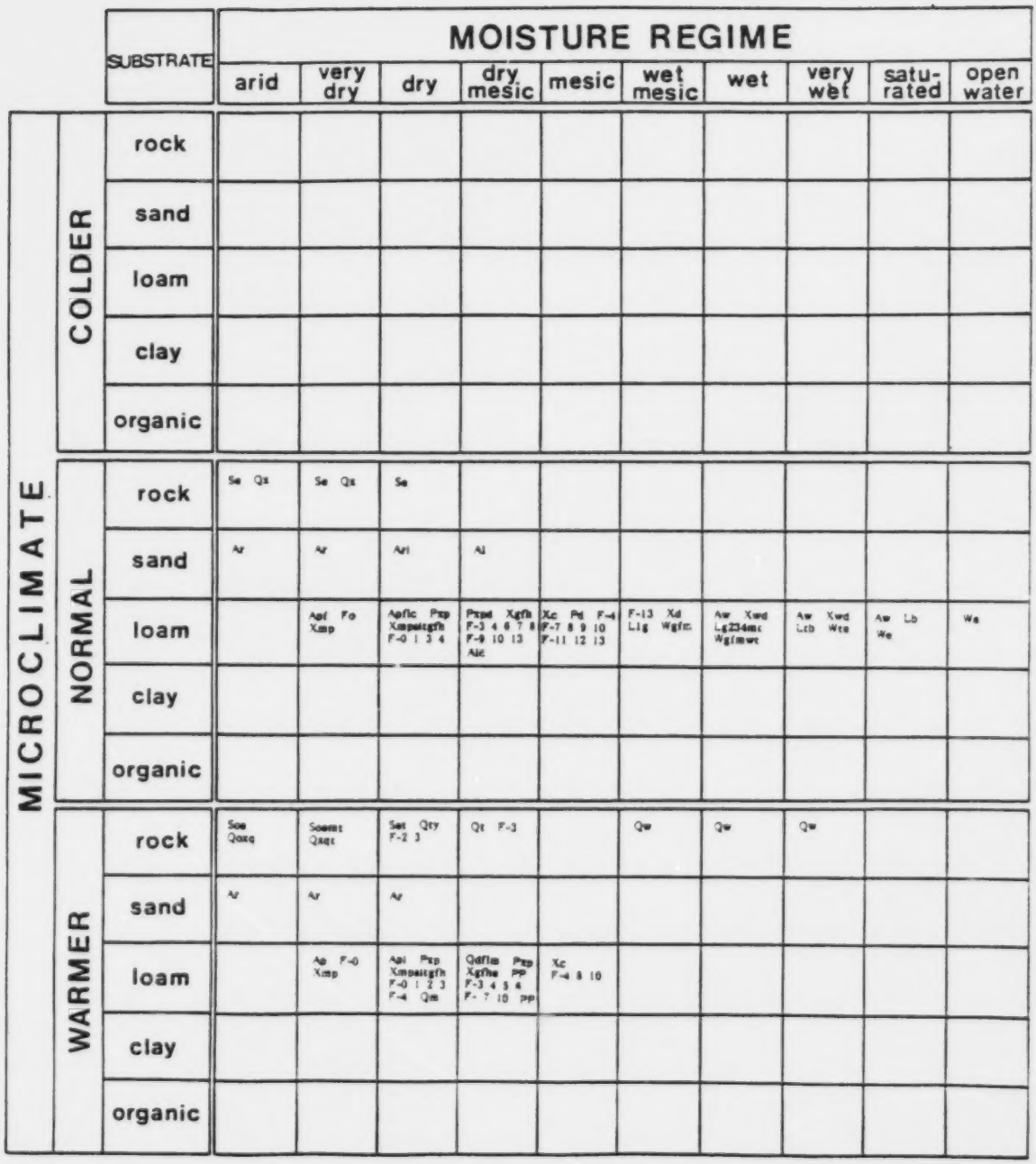

Figure 7: Site Type Matrix for Vegetation Communities of the Oriskany Sandstone and Woodlands Area of Natural and Scientific Interest

species, and retards succession. There is a constant presence of native species which would be expected under such conditions, as well as a less constant presence of invasive species.

The tree and shrub covers are extremely open, with only scattered white oak (**Quercus alba**), eastern red cedar (**Juniperus virginiana**), fire cherry (**Prunus pensylvanica**), gray dogwood (**Cornus foemina** subsp. **racemosa**), wild snowberry (**Symphoricarpos albus**), velvet-leaved blueberry (**Vaccinium myrtilloides**) and others.

The herb cover varies from being very open to locally closed, and is characterized by the presence of common hair grass (**Deschampsia flexuosa**), poverty oat grass (**Dathonia spicata**), tufted love grass (**Eragrostis pectinacea***), sheep sorrel (**Rumex acetosella***), early saxifrage (**Saxifraga virginiensis**), robin's plantain (**Erigeron pulchellus**), mossy stonecrop (**Sedum acre***) and Bicknell's cranesbill (**Geranium bicknellii**). Indeed, in the open pastures about UTM 864553 the last 2 species often form closed carpets on the weathering sandstone. Also included in the complement, often as dominants, are hairy panic grass (**Dichanthelium acuminatum**), common witch grass (**Panicum capillare***), yellow foxtail (**Setaria glauca***), hairy-fruited spurge (**Euphorbia maculata**), wild basil (**Satureja vulgaris**), yarrow (**Achillea millefolium***) and gray-stemmed goldenrod (**Solidago nemoralis**).

Additionally, several mosses and lichens were noted here, including **Hedwigia ciliata**, **Bryum** species and **Cladonia** species.

86 species are recorded from this community (1 tree, 18 shrubs, 67 herbs).

Significant species[1] occurring in association with this community are 2 regionally significant shrubs: smooth sumac (**Rhus glabra**), dwarf Juneberry (**Amelanchier sanguinea**), and 4 regionally significant herbs: common hair grass (**Deschampsia flexuosa**), early saxifrage (**Saxifraga virginiensis**), panicled tick-trefoil (**Desmodium paniculatum** var. **paniculatum**) and Bicknell's cranesbill (**Geranium bicknellii**). As noted in Fahselt et al. (1979), in Ontario, several of these species are more typical of the acidic rocklands of the Canadian Shield.

S-e Arid - Dry: Sandstone Escarpment Face

This community pattern occurs on the exposed sandstone of the low escarpments and the several shelving strata of the bedrock (0.06 ha.). It occurs in 2 general environments: open sites and under forest canopy. These present acidic rockland substrates in a warmer to normal microclimate with arid to dry moisture regimes.

The more widespread, arid to very dry, very open situations support an open tree and shrub complement which includes upland Virginia creeper (**Parthenocissus inserta**), wild snowberry (**Symphoricarpos albus**), riverbank grape (**Vitis riparia**) and smooth sumac (**Rhus glabra**).

The herb cover is open to closed, and supports an eclectic and inconstant complement which includes Canada blue grass (**Poa compressa**), sheep sorrel (**Rumex**

1. In this discussion provincial significance means provincially rare (Argus & White 1982, 1983; Argus & Keddy 1984; Argus et al. 1987), and regional significance means regionally rare or very uncommon within Haldimand - Norfolk (Sutherland 1987); non-native significant species are indicated by an asterisk (*).

acetosella*), purslane (**Portulaca oleracea***), herb-Robert (**Geranium robertianum**), catnip (**Nepeta cataria***) and many others. Occasionally this phase of the community is associated with those older quarry faces which have been undisturbed for many years.

The less xeric, shaded, forest situations support a distinctively different complement of typical cliff species, including several ferns, such as marginal woodfern (**Dryopteris marginalis**), Mackay's fragile fern (**Cystopteris tenuis**) and bulblet fern (**C. bulbifera**), as well as herb-Robert (**Geranium robertianum**) and deadly nightshade (**Solanum dulcamara***), and often closed carpets of mosses, such as **Anomodon attenuata**) and **Hedwigia ciliata.** The low cliff located north of Town Line Road (about UTM 854552) is an excellent example of this community.

78 species are associated with the phases of this community (3 trees, 13 shrubs, 62 herbs).

6 regionally significant species are associated with these situations: smooth sumac (**Rhus glabra**), common hair grass (**Deschampsia flexuosa**), early saxifrage (**Saxifraga virginiensis**), Bicknell's cranesbill (**Geranium bicknellii**), butterfly weed (**Asclepias tuberosa**) and Virginia mountain mint (**Pycnanthemum virginianum**), as is 1 non-native shrub: sour cherry (**Prunus cerasus***).

S-m Very Dry: Sandstone Pavement Meadow

This community is successional onto the Sandstone Pavement Barrens, where soil development is slightly more evident (4.65 ha.). Its site type characteristics include warmer microclimate, rock substrate and very dry moisture regime. It presents a semiclosed to closed meadow with only scattered trees, but occasional thicket intrusions.

The very open tree and shrub cover includes bur oak (**Quercus macrocarpa**), shagbark hickory (**Carya ovata**) and hawthorn (**Crataegus** species).

The semiclosed to closed herb cover is generally characterized by the presence of eastern bracken fern (**Pteridium aquilinum**), orchard grass (**Dactylis glomerata**), Timothy grass (**Phleum pratense***), poverty oat grass (**Danthonia spicata**), rough-fruited cinquefoil (**Potentilla recta***), common St. John's-wort (**Hypericum perfoliatum***), arrow-leaved violet (**Viola sagittata**), arrow-leaved Aster (**Aster urophyllus**), smooth hawkweed (**Hieracium piloselloides***) and Canada goldenrod (**Solidago canadensis**).

54 species are associated with this community (2 trees, 5 shrubs, 47 herbs).

1 nationally and provincially rare herb is reported from this community by Sutherland (1989): hairy pinweed (**Lechea villosa**). As well, 2 regionally significant species occurring here are prairie cinquefoil (**Potentilla arguta**) and Bicknell's cranesbill (**Geranium bicknellii**). This type also occurs as an inclusion in the Oak Opening upland forest community (F-0), where the bedrock is exposed, such as at UTM 858554. In these cases the herb cover also includes the nationally and provincially rare hairy bedstraw (**Galium pilosum**).

S-t Very Dry - Dry: Sandstone Pavement Thicket

Often forming a buffer between the above meadow and the surrounding communities is a closed thicket (1.71 ha.). This community develops where the soils are slightly more evident, even if only along fissures. It occurs in a warmer microclimate on the sandstone rock with very dry to dry moisture regimes. This type presents a transition toward the successional groves (X-g, X-f) which, where soil conditions allow, may invade over it from the surrounding forests.

It generally has scattered trees of poor development, mostly being trembling aspen (**Populus tremuloides**), eastern white pine (**Pinus strobus**), black oak (**Quercus velutina**) or white elm (**Ulmus americana**).

The shrub cover dominates the community structure with a closed to semiclosed aspect which is strongly dominated by gray dogwood (**Cornus foemina** subsp. **racemosa**), accompanied by fire cherry (**Prunus pensylvanica**), wild red raspberry (**Rubus idaeus** var. **strigosus**), hawthorn (**Crataegus** species), smooth sumac (**Rhus glabra**) and staghorn sumac (**Rhus typhina**).

The underlying herb cover is closed, and includes Kentucky blue grass (**Poa pratensis**), bastard toadflax (**Comandra umbellata**), sheep sorrel (**Rumex acetosella***), rough-fruited cinquefoil (**Potentilla recta***), Bicknell's cranesbill (**Geranium bicknellii**), wild bergamot (**Monarda fistulosa**), common mullein (**Verbascum thapsus***), arrow-leaved Aster (**Aster urophyllus**), yarrow (**Achillea millefolium***) and Canada goldenrod (**Solidago canadensis**).

This community includes 54 species (9 trees, 12 shrubs, 33 herbs).

Significant species associated with this community are the nationally and provincially rare hairy bedstraw (**Galium pilosum**) and hawthorn (**Crataegus dodgei**, Sutherland 1989), and the regionally significant smooth sumac (**Rhus glabra**), its hybrid with staghorn sumac (**R.** X **borealis**), Bicknell's cranesbill (**Geranium bicknellii**) and plumeless thistle (**Carduus acanthoides***).

Q QUARRY COMMUNITIES

The past and recent quarrying activity within the ANSI have resulted in the exposure of additional expanses of sandstone and limestone bedrock substrates. The thin, overlying soil deposits have been scraped away to below the deteriorated rock shards of the 'C horizon', and often the formations overlying the desired strata also have been removed and deposited in 'tip heaps' and berms. These sites present an early rockland successional environment for invading species in the more recently disturbed workings, and a distinctive successional series in the older quarries, which in some cases may resemble the remnant features of the Sandstone Pavement Communities. These communities cover 15.85 ha., or 5.18% of the ANSI's total surface area.. They occur in several locations within the ANSI and its immediate vicinity, with concentrations about the areas of recent quarry activity of the 1980s in its northwestern quarter (about UTMs 855561 and 858561), and in the older quarries of the early 1900s along both sides of Town Line Road (about UTMs 856554, 858554, 861553 and 865556). 9 communities associated with the recent and past quarrying activity are identified within the study area, and are discussed below and mapped in Map 1.

Q-o Arid: Recent Scraped Bedrock Pavement Preparation Barrens

The recent site preparation activity for the quarry development on the Nelson Aggregates Ltd. property (about UTMs 857561 to 862562) has stripped off the previously occurring vegetation (forest, meadow, prairie) and the thin soil and overburden cover, creating an 11 ha expanse of sandstone and limestone rock with a warmer microclimate and an arid moisture regime. Other smaller examples are located around the small quarry west of Dry Lake Road at UTM 855561, off Town Line Road at UTMs 857553 and 860552, and possibly elsewhere where there has been recent disturbance, or where virtually no succession has occurred over older workings. The sites off Dry Lake Road in the northern part of the study area lie outside the current ANSI boundaries. This whole community covers over 11 ha. within the general study area, but it covers only 3.09 ha. within the ANSI's boundaries.

The community structure here is very open, with only an extremely open tree seedling and shrub cover which includes trembling aspen (**Populus tremuloides**), Bebb's willow (**Salix bebbiana**), wild red raspberry (**Rubus idaeus** var. **strigosus**), gray dogwood (**Cornus foemina** subsp. **racemosa**) and climbing poison ivy (**Toxicodendron radicans** var. **radicans**).

The herb cover generally is very open to locally semiopen, and is dominated by a variety of early successional, mostly non-native species, as follows: yellow foxtail (**Setaria glauca***), Canada and Kentucky blue grasses (**Poa compressa, P. pratensis**), Timothy grass (**Phelum pratense***), mossy stonecrop (**Sedum acre***), field strawberry (**Fragaria virginiana**), black medick (**Medicago lupulina***), Queen Anne's lace (**Daucus carota***), common St. John's-wort (**Hypericum perfoliatum***), wild basil (**Satureja vulgaris**), wild bergamot (**Monarda fistulosa**), ox-eye daisy (**Leucanthemum vulgare***), yarrow (**Achillea millefolium***), rough fleabane (**Erigeron annuus** subsp. **strigosus**), robin's plantain (**E. pulchellus**), common ragweed (**Ambrosia artemisiifolia***), narrow hawk's-beard (**Crepis tectorum***) and gray-stemmed goldenrod (**Solidago nemoralis**).

93 species are associated with this community (3 trees, 10 shrubs, 80 herbs).

Regionally significant species occurring here are Kalm's brome grass (**Bromus kalmii**), Bicknell's cranesbill (**Geranium bicknellii**) and biennial wormwood (**Artemisia biennis***). The very few apparent remnants of the reported prairie community (PP) which formerly occurred in the vicinity of the large recent quarry (Fahselt et al. 1979) include round-headed bush-clover (**Lespedeza capitata**) and wild bergamot (**Monarda fistulosa**).

Q-x Arid - Very Dry: Old Scraped Bedrock Pavement Preparation Barrens / Meadow

The older quarry areas in the vicinity of the ANSI's northwestern corner (UTM 855561) and near the intersection of Dry Lake and Town Line Roads (UTMs 857554 and 860552) have undergone some succession in the past half century, but in many cases the bedrock or quarry workings, such as the old rail line's cinder roadbeds, are still quite evident (4.59 ha.). These rockland substrates present warmer to normal microclimates with arid to very dry moisture regimes.

This community's flora includes successional and some reestablishing species. The shrub cover are open with saplings of eastern red cedar (**Juniperus virginiana**), hawthorn (**Crataegus** species), staghorn sumac (**Rhus typhina**) and gray dogwood (**Cornus foemina** subsp. **racemosa**).

The herb cover is open to semiclosed, and is dominated by Canada and Kentucky blue grasses (**Poa compressa, P. pratensis**), sedge (**Carex pensylvanica**), rough-fruited cinquefoil (**Potentilla recta***), Alsike clover (**Trifolium hybridum***), black medick (**Medicago lupulina***), white sweet-clover (**Melilotus alba***), cow vetch (**Vicia cracca***), spreading dogbane (**Apocynum androsaemifolium**), wild basil (**Satureja vulgaris**) and others, and includes local populations of ebony spleenwort (**Asplenium platyneuron**).

61 species are recorded from this community (15 shrubs, 46 herbs).

3 native species recorded here are regionally significant: Pennsylvania raspberry (**Rubus pensilvanicus**), Bicknell's cranesbill (**Geranium bicknellii**) and, according to de Boer (1988), Venus' looking glass (**Triodanis perfoliata**). As well, 2 regionally significant non-native species occurring here are sour cherry (**Prunus cerasus***) and biennial wormwood (**Artemisia biennis***).

Q-q Arid - Very Dry: Quarry Basin Barrens / Meadow Complex

The open pits of the recent quarries present an arid to very dry rockland with warmer environment, conditions which are greatly limiting for the establishment of any species. As a result, the talus and pavement features here have a very depauperate flora. This community does not occur within the present boundaries of the ANSI.

Only 4, very scattered herb species recorded: ensheathed dropseed (**Sporobolus vaginiflorus** var. **inaequalis**), narrow hawk's beard (**Crepis tectorum***), Canada blue grass (**Poa compressa**) and common pepper-grass (**Lepidium densiflorum**).

No significant species are recorded from this community.

Q-t Very Dry - Dry Mesic: Quarry Basin Thicket / Meadow Complex

The less exposed portions of the several quarries in the ANSI may support a low barren successional community which is expressed as open meadow or closing thicket (1.50 ha.). The site type characteristics are warmer microclimate, rockland substrate and very dry to dry mesic moisture regimes. This community was recorded from the quarries at UTMs 855561, 856554 and 859554.

The tree cover is quite open with species, such as peach-leaved willow (**Salix amygdaloides**), large-toothed aspen (**Populus grandidentata**) and white elm (**Ulmus americana**).

The shrub cover is closed to semiopen with wild red raspberry (**Rubus idaeus** var. **strigosus**), gray dogwood (**Cornus foemina** subsp. **racemosa**), staghorn sumac (**Rhus typhina**), common lilac (**Syringa vulgaris**) and others.

The herb cover is semiopen to closed, and is dominated by Canada blue grass (**Poa compressa**), rough-fruited cinquefoil (**Potentilla recta***), field strawberry (**Fragaria virginiana**), white wild licorice (**Galium circaezans**), creeping bellflower (**Campanula rapunculoides***), Canada goldenrod (**Solidago canadensis**) and common dandelion (**Taraxicum officinale***).

28 species are recorded from this community (12 trees, 9 shrubs, 7 herbs).

The only regionally significant species recorded here is the non-native sour cherry (**Prunus cerasus***).

Q-g Dry: Quarry Basin Grove

In the older quarry basins near the intersection of Dry Lake and Town Line Roads (UTM 858554) and elsewhere, the advance of succession has produced deciduous groves of young to intermediate ages (2.33 ha.). This warmer, dry, rockland site type presents a somewhat kinder, gentler environment for plant succession.

The tree cover generally is open, and is dominated by large-toothed aspen (**Populus grandidentata**), trembling aspen (**P. tremuloides**), white ash (**Fraxinus americana**), sugar maple (**Acer saccharum**) or eastern white pine (**Pinus strobus**).

The shrub cover is closed to semiopen, and is dominated by gray dogwood (**Cornus foemina** subsp. **racemosa**), black cherry (**Prunus serotina**), lowland Virginia creeper (**Parthenocissus inserta**) or eastern red cedar (**Juniperus virginiana**).

The herb cover is semiopen to closed with a species complement which includes native and successional species. Dominants here are eastern bracken fern (**Pteridium aquilinum**), tall false Solomon's-seal (**Smilacina racemosa**), wild columbine (**Aquilegia canadensis**), field strawberry (**Fragaria virginiana**), black medick (**Medicago lupulina***), white wild licorice (**Galium circaezans**), arrow-leaved Aster (**Aster urophyllus**) and Canada goldenrod (**Solidago canadensis**).

47 species occur in association with this community (12 trees, 11 shrubs, 24 herbs).

1 nationally and provincially rare herb: hairy bedstraw (**Galium pilosum**) and 2 regionally significant species are recorded from here: smooth sumac (**Rhus glabra**) and Chinquapin oak (**Quercus muehlenbergii**).

Q-m Dry - Dry Mesic: Quarry Berm Meadow / Scattered Shrubs

The berms which were built around the recent quarry working to the north of the ANSI's boundary (UTM 862564) and elsewhere have a successional community development with open meadow and scattered shrubs (2.02 ha.). The substrate here effectually is a loam with a warmer microclimate and a dry to dry mesic moisture regime.

The shrub cover generally is very open with staghorn sumac (**Rhus typhina**), wild red raspberry (**Rubus idaeus** var. **strigosus**) and upland Virginia creeper (**Parthenocissus inserta**).

The herb cover is open to semiclosed, and includes Kentucky blue grass (**Poa pratensis**), meadow fescue (**Festuca pratensis***), rough-fruited cinquefoil (**Potentilla recta***), field strawberry (**Fragaria virginiana**), black medick (**Medicago lupulina***), yellow sweet clover (**Melilotus officinalis***), creeping poison-ivy (**Toxicodendron radicans** var. **rydbergii**), arrow-leaved Aster (**Aster urophyllus**), downy white Aster (**Aster pilosus** var. **pilosus**), black-eyed Susan (**Rudbeckia hirta**), Canada goldenrod (**Solidago canadensis**) and common dandelion (**Taraxicum officinale***).

38 species are associated with this community (1 tree, 4 shrubs, 33 herbs).

No significant species are recorded here; however, Riley (1988) indicates that downy white Aster (**Aster pilosus** var. **pilosus**) is rare in Central Region, while Sutherland (1987) indicated it to be only uncommon within the Regional Municipality of Haldimand - Norfolk.

Q-d Dry Mesic: Quarry Berm / Tip Pile Thicket / Grove

Commonly associated with the northerly and easterly slopes of the above berms and with the older quarry working piles is a somewhat closed thicket with scattered tree cover. These sites present warmer and normal microclimates on loam-like soils and a generally dry mesic moisture regime. This community presently lies beyond the ANSI's current boundaries.

The tree cover here is very open to semiopen, with trembling aspen (**Populus tremuloides**), eastern cottonwood (**P. deltoides**) or white ash (**Fraxinus americana**).

The shrub cover includes a closed complement of wild red raspberry (**Rubus idaeus**), red choke cherry (**Prunus virginiana**), gray dogwood (**Cornus foemina** subsp. **racemosa**) or staghorn sumac (**Rhus typhina**).

The herb cover is semiopen with field strawberry (**Fragaria virginiana**), lamb's-quarters (**Chenopodium album***), European wood-sorrel (**Oxalis fontana***), annual fleabane (**Erigeron annuus** subsp. **annuus**), ox-eye daisy (**Leucanthemum vulgare***) and others.

34 species occur here (3 trees, 11 shrubs, 20 herbs).

No significant species are recorded from this community, although Riley (1988) indicates that eastern cottonwood (**Populus deltoides**) is restricted within Central Region.

Q-f Dry Mesic - Mesic: Quarry Tip Pile Forest Complex

The rubble piles of the older quarry workings, such as that to the west of the intersection of Dry Lake and Town Line Roads present a normal to warmer microclimate with dry mesic to mesic loam conditions (20.07 ha.). This environment now supports a forest cover of intermediate age class. However, differentiating this from the natural forests is the strikingly eclectic complement of species associated with it.

The tree cover is closed to semiclosed, and is dominated by sugar maple (**Acer saccharum**), large-toothed aspen (**Populus grandidentata**), northern red oak (**Quercus rubra**), white ash (**Fraxinus americana**), white oak (**Quercus alba**), eastern white pine (**Pinus strobus**) and red maple (**Acer rubrum**), and includes occasional eastern white cedar (**Thuja occidentalis**) and planted black walnut (**Juglans nigra***).

The shrub cover is open to semiclosed with strong dominances of red choke cherry (**Prunus virginiana**), gray dogwood (**Cornus foemina** subsp. **racemosa**), upland Virginia creeper (**Parthenocissus inserta**) and downy arrowwood (**Viburnum rafinesquianum**), with an irregular presence of many other species.

The herb cover is open to semiclosed with dominants being eastern bracken fern (**Pteridium aquilinum**), false melic grass (**Schizachne purpurescens**), rough-leaved mountain rice (**Oryzopsis asperifolia**), tall false Solomon's-seal (**Smilacina racemosa**), wild lily-of-the-valley (**Maianthemum canadense**), field strawberry (**Fragaria virginiana**), wild Geranium (**Geranium maculatum**), wild sarsaparilla (**Aralia nudicaulis**), white wild bedstraw (**Galium circaezans**), large-leaved Aster (**Aster macrophyllus**), Canada goldenrod (**Solidago canadensis**), blue-stemmed goldenrod (**S. caesia**) and others.

103 species are associated with this community complex (18 trees, 23 shrubs, 63 herbs).

3 regionally significant species which occur here are the native sicklepod (**Arabis canadensis**), Pennsylvania raspberry (**Rubus pensilvanicus**) and Chinquapin oak (**Quercus muehlenbergii**).

Q-w Wet Mesic - Very Wet: Quarry Wet Meadow / Thicket Complex

Those quarries which support moist areas, through groundwater seepage or catchment depressions, frequently include elements of moist community complexes (0.61 ha.). These wet mesic to very wet conditions lie on rock substrates in normal and warmer microclimatic aspects. Its community structure and species complement are very inconsistant.

Only two tree species are recorded here: eastern cottonwood (**Populus deltoides**) and green ash (**Fraxinus pennsylvanica** var. **subintegerrima**); these are very scattered, but generally tall individuals.

The shrub cover is equally scattered with local small thickets of sandbar willow (**Salix exigua**), crack willow (**S. fragilis***), stiff willow (**S. eriocarpa**) and the introduced basket willow (**S. purpurea***).

The herb cover includes shallow pools and fringe swards of reed canary gass (**Phalaris arundinacea**), red-based spikerush (**Eleocharis erythropoda**), sedge (**Carex lurida**), lesser duckweed (**Lemna minor**), knotted rush (**Juncus nodosus**), northern bugleweed (**Lycopus uniflorus**) and others.

Only 16 species are recorded from this community (2 trees, 4 shrubs, 9 herbs, 1 aquatic).

No significant species are recorded from here, although Riley (1988) indictes eastern cottonwood to be restricted within Central Region.

A ANTHROPOGENIC COMMUNITIES

Anthropogenic communities are those which appear to be sustaining continual disturbances from human activities, such as ploughing, trampling or digging, and are not allowed to proceed along normal successional routes. They generally are located around the periphery of the Life Science ANSI, but several examples are locally included within the Earth Science ANSI boundary. These cover 3.00 ha, or 0.98% of the ANSI's total surface area, and only the first community (A-r) occurs within its present boundaries. While many of the species which occur here are common non-native invasives, several are of regional significance. 6 communities

are identified within the study area. These are briefly discussed below, and are mapped in Map 1 and Figure 6.

A-r Arid - Very Dry: Roadside Clearance Meadow

This community includes the open barrens and immediately adjacent meadows which occur along the right-of-way of the two municipal roads in the area (3.00 ha.). These have a coarse sand roadbed with arid to very dry moisture regimes in a normal to warmer range of microclimates.

The shrub cover here is extremely open, mostly being restricted to suckers or saplings invading from the adjacent hedges, and includes staghorn sumac (**Rhus typhina**), hawthorn (**Crataegus** species) and others.

The herb cover varies from being extremely open where periodic road grading occurs, to semiclosed along the outer margins of the right-of-way. Herbs recorded here include quack grass (**Agropyron repens***), smooth brome grass (**Bromus inermis***), smooth crab grass (**Digitaria ischaemum***), tufted love grass (**Eragrostis pectinacea***), common witch grass (**Panicum capillare***), fall panic grass (**P. dicotomiflorum**), orange day-lily (**Hemerocallis fulva***), hairy-fruited spurge (**Euphorbia maculata**), black medick (**Medicago lupulina***), yellow toadflax (**Linaria vulgaris***), dwarf snapdragon (**Chaenorrhinum minus***), broad-leaved plantain (**Plantago major***), perennial sow-thistle (**Sonchus arvensis***), common ragweed (**Ambrosia artemisiifolia***), chickory (**Cichorium intybus***), stinking May weed (**Anthemis cotula***), Canada thistle (**Cirsium arvense***), coltsfoot (**Tussilago farfara***) and many others.

78 species are recorded within this community (6 shrubs, 72 herbs).

Regionally significant species occurring here are the native smooth sumac (**Rhus glabra**), and beggar's-lice (**Hackelia virginiana**), and the non-native dwarf spurge (**Euphorbia exigua***), which is newly reported for the region (Sutherland 1987, 1989).

A-p Very Dry - Dry: Pasture Meadow

Agricultural activities in the study area include grazing by sheep in the open pastures south of Town Line Road, and by cattle elsewhere. This community generally is closely cropped with a mixed complement of grass and forb forage species. The environment here is a normal to warmer microclimate with very dry to dry, loamy substrates.

Tree and shrub covers are extremely open, and include white ash (**Fraxinus americana**), wild red raspberry (**Rubus idaeus** var. **strigosus**) and black raspberry (**R. occidentalis**).

The herb cover is semiopen to semiclosed, and is dominated by Canada blue grass (**Poa compressa**), Timothy grass (**Phleum pratense***), orchard grass (**Dactylis glomerata***), meadow fescue (**Festuca pratensis***), field pepper-grass (**Lepidium campestre**), field strawberry (**Fragaria virginiana**), birdfoot trefoil (**Lotus corniculatus***), red clover (**Trifolium pratense***), English plantain (**Plantago lanceolata***), common dandelion (**Taraxicum officinale***), orange hawkweed (**Hieracium aurantiacum***), rough fleabane (**Erigeron strigosus** subsp. **strigosus**) and others.

30 species are recorded here (1 tree, 5 shrubs, 24 herbs).

No significant species are recorded from this community.

A-f Very Dry - Dry: Farmyard Barrens

Farmyards tend to be intensively trampled by livestock, and the resulting associated flora is composed predominantly of the aggressively invasive species. The several farms within the study area (UTMs 864554 and 866557) support this community. It occurs in a normal, very dry to dry, loam site type class.

The herb cover here is generally open with local barrens and turf areas. Predominant species include orchard grass (**Dactylis glomerata***), lamb's-quarters (**Chenopodium album***), oak-leaved goosefoot (**C. glaucum***), maple-leaved goosefoot (**C. hybridum** var. **gigantospermum**), common ragweed (**Ambrosia artemisiifolia***), Canada thistle (**Cirsium arvense***), spiny-leaved sow thistle (**Sonchus asper**), ox-eye daisy (**Leucanthemum vulgare***) and common burdock (**Arctium minus***).

All 23 species associated with this community are herbs.

No significant species are recorded from this community.

A-l Dry - Dry Mesic: Lawn

Manicured lawns are scattered in the study area. The community occurring here has a very restricted range of dominant species, although incidental 'weeds' invariably accompany them. The site type characteristics here are warmer and normal microclimates, dry to dry mesic moisture regimes and loam-like soils.

The species recorded from several lawns include the following herbs: Canada blue grass (**Poa compressa**), annual blue grass (**P. annua***), Kentucky blue grass (**P. pratensis**), meadow fescue (**Festuca pratensis***), perennial rye grass (**Lolium perenne** var. **perenne***) and others.

All 14 species recorded here are herbs.

No significant species were recorded during the survey.

A-c Dry - Dry Mesic: Cropland and Margin

The agricultural use of the open croplands centres on the production of corn, wheat and soya bean. Invasive weeds along their margins rarely become well established. This occurs on dry to dry mesic loamy substrates in a normal microclimate.

The herb cover includes a variety of aggressive 'weeds', such as fall panic grass (**Panicum dichotomiflorum**), yellow foxtail (**Setaria glauca***), lamb's-quarters (**Chenopodium album***), penny grass (**Thlaspi arvense***), meadow sundrops (**Oenothera perennis**), velvet leaf (**Abutilon theophrasti***), black nightshade (**Solanum nigrum** var. **americanum**) and others.

12 species occur in this community (1 shrub, 11 herbs).

1 regionally significant shrub is recorded from this community: Pennsylvania raspberry (**Rubus pensilvanicus**).

A-w Wet - Saturated: Dugout Pond Meadow

Several dugout ponds in the study area provide irrigation and livestock water for the agricultural activities. These share several species with the wetlands, but retain a distinctivly juvenile species complement and community structure. Their environment is a wet to saturated loam in a normal microclimate.

Shrub species may form semiopen thicket fringes around the dugouts; these include pussy willow (**Salix discolor**), stiff willow (**S. eriocephala**) and red osier dogwood (**Cornus stolonifera**).

The herbs are very open to closed, with the dominants including rice cut grass (**Leersia oryzoides**), fowl meadow grass (**Poa palustris**), red-based spikerush (**Eleocharis erythropoda**), sedge (**Carex vulpinoidea**), straw-coloured nut-grass (**Cyperus strigosus**), ditch stonecrop (**Penthorum sedoides**), leafy beggar's-ticks (**Bidens frondosa**) and others.

16 species are recorded here (3 shrubs, 13 herbs).

No significant species are recorded from this community.

X SUCCESSIONAL COMMUNITIES

Successional communities have developed in those portions of the study area which formerly were disturbed, but now have developed vegetation features which are succeeding along normal routes toward a semistable condition without the constant interruption of human disturbances. They occur in several locations within the ANSI and its immediate vicinity, with one notable successional complex in the ANSI's northwestern quarter to the west of Dry Lake Road (about UTM 855561). They support a wide variety of native and non-native species, in particular those which are able to maintain presence once they have become established. 11 communities are recorded from the ANSI area, together covering 54.64 ha., or 17.85% of the ANSI's surface area. They are discussed below, and are mapped in Map 1 anf Figure 6.

X-m Very Dry - Dry: Old Field Open Meadow

The arid to dry loam soils of the normal and warmer microclimatic situations which occur on the plain support several examples of this community (about UTMs 855556, 862555 and 862567) which together cover 33.3 ha. within the ANSI. In many instances, these have been succeeded over by invasive shrub species to become the successional meadow (X-s) or the thicket communities (X-l, X-t). This feature, however, is relatively free of such thicket cover at this time.

The presence of trees and shrubs is inconstant, with an extremely to very open cover which includes white ash (**Fraxinus americana**), hawthorn (**Crataegus monogyna**), staghorn sumac (**Rhus typhina**) and gray dogwood (**Cornus foemina**

subsp. **racemosa**).

The herb cover is closed and supports a number of native and non-native species, with the dominants including Kentucky blue grass (**Poa pratensis**), sedge (**Carex cephalophora**), Deptford pink (**Dianthus armeria***), field strawberry (**Fragaria virginiana**), black medick (**Medicago lupulina***), white sweet-clover (**Melilotus alba***), common St. John's-wort (**Hypericum perfoliatum***), Queen Anne's lace (**Daucus carota***), wild bergamot (**Monarda fistulosa**), yarrow (**Achillea millefolia***), common dandelion (**Taraxicum officinale***), orange hawksbeard (**Hieracium aurantiacum***), gray-stemmed goldenrod (**Solidago nemoralis**), Canada goldenrod (**S. canadensis**) and others.

58 species are associated with this community (5 trees, 11 shrubs, 41 herbs).

2 regionally significant species recorded from here are the native shrub: smooth sumac (**Rhus glabra**), and young trees of Chinquapin oak (**Quercus muehlenbergii**).

X-p Very Dry - Dry: Old Field Prairie Inclusions

Locally occurring in association with the successional meadows and thickets are concentrations of species which are regarded as having prairie affinities. 2 good examples are in the northwestern quarter of the ANSI, west of Dry Lake Road (UTMs 856557 and 855560) presenting a total of 3.75 ha. 3 to 5 of these species commonly will exist together, but occasionally there will be only 1 present. The site type characteristics here are normal and warmer microclimate, very dry to dry moisture regime and a loam substrate.

There may be an extremely open tree cover which includes eastern white pine (**Pinus strobus**), shagbark hickory (**Carya ovata**), black oak (**Quercus velutina**) and others.

The shrub cover is semiopen to very open with the dominant species being gray dogwood (**Cornus foemina** subsp. **racemosa**), accompanied locally by silky dogwood (**C. amomum** subsp. **obliquum**) or shrubby Juneberry (**Amelanchier spicata**).

The herb cover is closed, and includes many of the 'old field' species indicated for the above community (X-m), but is characterized by the presence of prairie habitat species, such as panicled tick-trefoil (**Desmodium paniculatum** var. **paniculatum**), Dillen's tick-trefoil (**D. paniculatum** var. **dillenii**), showy tick-trefoil (**D. canadense**), round-headed bush-clover (**Lespedeza capitata**), wand-like bush-clover (**L. intermedia**), Siberian dogbane (**Apocynum sibiricum** var. **cordigerum**), wild bergamot (**Monarda fistulosa**), gray-stemmed goldenrod (**Solidago nemoralis**) and early goldenrod (**S. juncea**).

37 species are associated with this community (9 trees, 4 shrubs, 24 herbs).

In addition to the prairie species indicated above, there are 2 regionally significant species here: panicled tick-trefoil (**Desmodium paniculatum** var. **paniculatum**), and Chinquapin oak (**Quercus muehlenbergii**). The several communities within the ANSI and its vicinity which were examined did not appear to contain the rich complement of significant species which was recorded by Maycock and Ball from the 'prairie meadow' that existed where the recent quarry development was undertaken (about UTM 858562, see PP).

X-s Dry: Old Field Meadow / Thicket Succession

This is the most commonly occurring 'old field' community within the ANSI (1.13 ha.). It spans the open meadows (X-m) and the more closed thickets (X-l, X-t), and shares many species with them. It occurs in several relatively extensive areas, notably in the ANSI's northwestern, central and eastcentral portions (about UTMs 856557 to 854561, 860552 and 867559). Its environmental features are normal and warmer microclimatic situations on dry loams.

The tree cover is very open, and has, as dominants, trembling aspen (**Populus tremuloides**), large-toothed aspen (**P. grandidentata**), white ash (**Fraxinus americana**) and white elm (**Ulmus americana**).

The shrub cover is closed to semiopen, and includes a wide variety of species; the dominants tend to be gray dogwood (**Cornus foemina** subsp. **racemosa**), staghorn sumac (**Rhus typhina**), wild red raspberry (**Rubus idaeus** subsp. **strigosus**), wild crab apple (**Malus coronaria**), hawthorn (**Crataegus** species) and others.

The herb cover includes a wide variety of native and non-native species. The dominants tend to be Canada blue grass (**Poa compressa**), poverty oat grass (**Danthonia spicata**), birdfoot trefoil (**Lotus corniculatus***), white clover (**Trifolium repens***), rough-fruited cinquefoil (**Potentilla recta***), Queen Anne's lace (**Daucus carota***), English plantain (**Plantago lanceolata***), orange hawkweed (Hieracium **aurantiacum***), arrow-leaved Aster (**Aster urophyllus**), yarrow (**Achillea millefolium***), black-eyed Susan (**Rudbeckia hirta**), gray-stemmed goldenrod (**Solidago nemoralis**) and others.

94 species occur in this association (8 trees, 19 shrubs, 67 herbs).

Regionally significant species here are Chinquapin oak (**Quercus muehlenbergii**), dwarf Juneberry (**Amelanchier sanguinea**), Pennsylvania raspberry (**Rubus pensilvanicus**) and the introduced black knapweed (**Centaurea nigra***). Additionally, there are several species of interest, including natives, such as Indian hemp (**Apocynum cannabinum**), and non-natives, such as live-forever (**Sedum telephium***) and wild parsnip (**Pastinaca sativa***) which have this as their only habitat within the ANSI.

X-l Dry: Old Field Low Thicket

This community is a densely closed phase of the above open meadow / thicket (X-s), and covers 1.87 ha. within the ANSI. In this case, the shrub cover is closed to the point of shading out the herb cover and reducing its diversity. Its site type features are normal and warmer microclimate, dry moisture regime and loam substrate.

The tree cover is extremely open, with eastern white pine (**Pinus strobus**) and trembling aspen (**Populus tremuloides**) being the most commonly present.

The shrub cover is very closed and invariably is dominated by gray dogwood (**Cornus foemina** subsp. **racemosa**), accompanied by a lesser occurrence of staghorn sumac (**Rhus typhina**) and hawthorn (**Crataegus** species).

The herb cover is open to locally semiclosed, with dominants being field strawberry (**Fragaria virginiana**), white avens (**Geum canadense**), black medick (**Medicago lupulina***), Queen Anne's lace (**Daucus carota***), common speedwell

(**Veronica officinalis***) and others. Also included with these mainly non-native species are the very occasional occurrences of native woodland herbs, such as pointed-leaved tick-trefoil (**Desmodium glutinosum**).

38 species are recorded here (8 trees, 9 shrubs, 21 herbs).

1 regionally significant species is associated with this community: panicled tick-trefoil (**Desmodium paniculatum** var. **paniculatum**).

X-t Dry: Old Field Tall Thicket

This community is a later stage of succession where hawthorn has become the predominant cover species and, at least locally, forms a closed, tall thicket. The northwestern quarter of the ANSI presents a large expanse of this community (4.5 ha.). Its dry loam substrates occupy normal and warmer microclimatic situations.

The tree cover is open to locally semiclosed, and has a variety of species, including white ash (**Fraxinus americana**), bur oak (**Quercus macrocarpa**), trembling aspen (**Populus tremuloides**) and others.

The tall shrub cover phase is decidedly dominated by a closed cover of several species of hawthorn (**Crataegus punctata, C. succulenta**), while the shorter shrub cover phase includes gray dogwood (**Cornus foemina** subsp. **racemosa**), several species of brambles (**Rubus idaeus** var. **strigosus, R. occidentalis, R. allegheniensis, R. flagellaris**), red choke cherry (**Prunus virginiana**) and others.

The herb cover is quite diverse and includes a notable mixture of many of the 'old field' species which are indicated above and invasive 'woodland' species, such as rough-leaved mountain rice (**Oryzopsis asperifolia**), sedges (**Carex pensylvanica, C. radiata**[1]), white avens (**Geum canadense**), common enchanter's nightshade (**Circaea lutetiana**), dog violet (**Viola conspersa**), white wild bedstraw (**Galium circaezans**) and others. As well, there is a notable increase in mosses in the ground cover of this community.

There are 91 species in this community (14 trees, 22 shrubs, 55 herbs).

Regionally significant species occurring here are Pennsylvania raspberry (**Rubus pensilvanicus**), smooth sumac (**Rubus glabra**) and Bicknell's cranesbill (**Geranium bicknellii**), and of interest are American wild plum (**Prunus americana**) and the introduced Morrow's honeysuckle (**Lonicera morrowi***).

X-g Dry - Dry Mesic: Successional Grove Poplar

This is a common and widespread community which is distinguised by the advance of the successional large-toothed aspen over 'old fields' (2.48 ha.). Often it forms a buffering fringe along more natural woodlots where it occupies normal and warmer sites with dry to dry mesic loam substrates. The advance of the trees is probably by suckers which advance underground; hence, the stands actually may be clones.

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1. This is the **Carex rosea** of older floras, not that species indicated by Argus et al. 1982 as being provincially rare.

The decidedly dominant tree forming a closed to semiclosed cover here is large-toothed aspen (**Populus grandidentata**), but this may be accompanied by northern red oak (**Quercus rubra**), eastern white pine (**Pinus strobus**) and others.

The shrub cover also is closed to semiclosed, and is dominated by several old field species, such as hawthorn (**Crataegus** species), gray dogwood (**Cornus foemina** subsp. **racemosa**) and staghorn sumac (**Rhus typhina**).

The herb cover is semiopen, mainly with field species. Dominants here are eastern bracken fern (**Pteridium aquilinum**), field strawberry (**Fragaria virginiana**), white avens (**Geum canadense**), black medick (**Medicago lupulina***) and arrow-leaved Aster (**Aster urophyllus**).

30 species are recorded from this community (9 trees, 12 shrubs, 8 herbs).

1 regionally significant species occurs here: Chinquapin oak (**Quercus muehlenbergii**), but there is an interesting presence of the non-native shrub: Morrow's honeysuckle (**Lonicera morrowii***).

X-f Dry - Dry Mesic: Successional Grove Mixed Trees

Slowly advancing over the successional fields and thickets in the warmer and normal, dry to dry mesic loams to the west of Dry Lake Road (UTM 856558) is an early stage of a dry forest community. This may have its origins as hedgerows along the road and separating the fields which served as a source of seeds, and from which it appears to be spreading (2.39 ha.).

The tree cover is open to semiopen, and commonly includes white oak (**Quercus alba**), northern red oak (**Q. rubra**), white ash (**Fraxinus americana**), eastern white pine (**Pinus strobus**), shagbark hickory (**Carya ovata**), bitternut hickory (**C. cordiformis**), trembling aspen (**Populus tremuloides**) and sugar maple (**Acer saccharum**).

The shrub cover is semiclosed to closed, and includes many remnants of the old field thicket communities, such as gray dogwood (**Cornus foemina** subsp. **racemosa**), red choke cherry (**Prunus virginiana**), wild red raspberry (**Rubus idaeus** var. **strigosus**), black raspberry (**R. occidentalis**), hawthorn (**Crataegus** species), maple-leaved Viburnum (**Viburnum acerifolium**) and wild crab apple (**Malus coronaria**).

The semiopen herb cover also includes the 'old field' species with occasional woodland invasives; generally dominant here are Kentucky blue grass (**Poa pratensis**), orchard grass (**Dactylis glomerata***), tall false Solomon's-seal (**Smilacina racemosa**), rough-fruited cinquefoil (**Potentilla recta***), black medick (**Medicago lupulina***), common enchanter's nightshade (**Circaea lutetiana**), wild basil (**Satureja vulgaris**) and arrow-leaved Aster (**Aster urophyllus**).

There are 43 species associated with this community (13 trees, 16 shrubs, 14 herbs).

2 regionally Significant species are recorded here: Pennsylvania raspberry (**Rubus pensilvanicus**) and Chinquapin oak (**Quercus muehlenbergii**), a notable dry site tree species. As well, Ball (1977, 1988) reports hackberry (**Celtis occidentalis**) and a hybrid oak (**Quercus alba** X **Q. macrocarpa**) here.

X-h Dry - Dry Mesic: Hedge Row Grove / Thicket

This community complex includes those hedge rows which simply consist of tall shrubs, and those which present a more complex range of tree and shrub species which generally were planted along access roads as windbreaks between fields (2.54 ha.). These dry to dry mesic, loamy soiled sites occur in normal and warmer microclimatic situations.

The tree cover varies from very open to closed, and includes among its common members black cherry (**Prunus serotina**), sugar maple (**Acer saccharum**), black oak (**Quercus velutina**), large-toothed aspen (**Populus grandidentata**) and eastern white pine (**Pinus strobus**).

The shrub cover is semiopen where there is a tree cover, but is very closed where the thicket phase occurs; common species here are hawthorn (**Crataegus** species), gray dogwood (**Cornus foemina** subsp. **racemosa**) and wild red raspberry (**Rubus idaeus** var. **strigosus**).

The herb cover generally is semiopen with an eclectic complement which includes Kentucky blue grass (**Poa pratensis**), Canada blue grass (**P. compressa**), garlic mustard (**Alliaria petiolata***), field strawberry (**Fragaria virginiana**), Queen Anne's lace (**Daucus carota***), wild basil (**Satureja vulgaris**), rough fleabane (**Erigeron annuus** subsp. **strigosus**) and others.

44 species occur here (13 trees, 10 shrubs, 21 herbs).

There are 3 regionally significant species here: the native Chinquapin oak (**Quercus muehlenbergii**), and 2 non-native species: goat willow (**Salix caprea***) and goutweed (**Aegopodium podagraria***), both of which probably have escaped from cultivation and locally persisting.

X-c Dry Mesic - Mesic: Forest Clearcut

Recent disturbances in the upland forests, through cutting, access road development or other clearances, have left openings in the tree canopies which have allowed relatively unhindered growth in the undergrowth (2.33 ha.). These situations have normal and warmer microclimates with dry mesic to mesic loams, depending upon the hosting forest.

The tree cover generally is open and includes many species of the surrounding forest, such as sugar maple (**Acer saccharum**) or white ash (**Fraxinus americana**).

The shrub cover is open to locally closed, and includes among its dominants red choke cherry (**Prunus virginiana**), black raspberry (**Rubus occidentalis**), wild red raspberry (**R. idaeus** var. **strigosus**) and maple-leaved Viburnum (**Viburnum acerifolium**).

The herb cover is open to very closed, often with an explosion of the native and invasive non-native shade tolerant species. Commonly occurring here are (**Poa annua**), awned slender muhly grass (**Muhlenbergia frondosa**), sedges (**Carex intumescens, C. tenera**), three-seeded mercury (**Acalypha rhomboidea**), curled dock (**Rumex crispa**), white avens (**Geum canadense**), herb-Robert (**Geranium robertianum**), hedge parsely (**Torilis japonica***), American pennyroyal (**Hedeoma pulegioides**), deadly nightshade (**Solanum dulcamara***), white vervain (**Verbena urticifolia**), Indian tobacco (**Lobelia inflata***), Canada goldenrod (**Solidago canadensis**) and many others.

97 species are recorded from this successional community (6 trees, 14 shrubs, 77 herbs).

2 regionally significant native species recorded here are Pennsylvania raspberry (**Rubus pensilvanicus**) and beggar's-lice (**Hackelia virginiana**).

X-w Wet Mesic - Wet: Drainage Ditch Meadow / Thicket

Several agricultural drainage ditches are in the vicinity of the ANSI, but do not within the ANSI itself. These have not been cleaned out recently, and have developed a successional wet meadow and thicket community complex. These wet mesic to wet loamy sites of a normal microclimate may share species with the wetland and lowland communities.

There is no development of a tree cover here, and the shrub cover varies from open to semi-closed, with rough willow (**Salix eriocarpa**) and crack willow (**S. fragilis** var. **fragilis***).

The herb cover is closed and overgrown to open, with sedges (**Carex** species), rice cut grass (**Leersia oryzoides**), needle spikerush (**Eleocharis acicularis**) and fringed loosestrife (**Lysimachia ciliata**).

At least 6 species are recorded here (2 shrubs, 4 herbs).

1 regionally significant species was observed within this community: sedge (**Carex projecta**).

X-d Wet Mesic - Very Wet: Wetland Berm of Dam and Ditch

The recently constructed dam between the two ponds of the Dry Lake Basin (UTM 866542) and the berm of the ditch which extends to the north (UTM 863543) present a newly disturbed mineral substrate which is quite favourable for the establishment of 'weedy species'. This situation spans wet mesic to very wet loamy soils in a normal microclimate, and covers 0.37 ha. within the ANSI.

The tree cover is open to locally closed, with Carolina poplar (**Populus** X **canadensis**), trembling aspen (**P. tremuloides**), green ash (**Fraxinus pennsylvanica** var. **subintegerrima**) and others.

The shrub cover is locally closed with stiff willow (**Salix eriocephala**) and peach-leaved willow (**S. amygdaloides**).

The herb cover is semiclosed with an eclectic complement which includes both upland and lowland successional species: blood-stained bulrush (**Scirpus microcarpus** var. **rubrotinctus**), rough cinquefoil (**Potentilla norvegica**), white sweet-clover (**Melilotus alba***), Queen Anne's lace (**Daucus carota***), heal-all (**Prunella vulgaris** var. **lanceoloata**), Indian tobacco (**Lobelia inflata***), bull thistle (**Cirsium vulgare***), Canada goldenrod (**Solidago canadense**), perennial sow-thistle (**Sonchus arvense***), narrow-leaved goldenrod (**Euthamia graminifolia**) and American burnweed (**Erechtites heiracifolia**).

36 species are recorded here (6 trees, 3 shrub, 27 herbs).

No regionally significant species are recorded from here.

P PLANTATION

Only 4.41 ha., or 1.44% of the Life Science ANSI's total surface area is planted in coniferous or deciduous plantation. These mostly occupy local, former old field situations, such as those at UTMs 858557 and 860553. Additionally, the Earth Science ANSI boundary and the rest of the study area along the eastern boundary include a large extent of plantation of intermediate to submature age class, and a younger Christmas tree production area. These communities provide the only coniferous cover in the area, and are valuable for the winter shelter they provide for wildlife, such as deer and birds.

P-x Dry - Dry Mesic: Young Coniferous Plantation

Several of the old fields have been planted in the past decade for plantation development and to replace those which have been cut in the past for harvesting and Christmas trees farming (0.78 ha.). The greatest extent lies beyond the Life Science ANSI boundary on the eastern side. The site type characteristics here are normal and warmer microclimate, dry to dry mesic moisture regimes and loam soil substrate.

The tree cover is juvenile at this time, with an open growth of young eastern white pine (**Pinus strobus***).

The shrub species include scattered Carolina rose (**Rosa carolina**) and multiflora rose (**R. multifida***, which has been planted for wildlife cover).

The herb species reflect the old field origins of the community; common here are eastern bracken fern (**Pteridium aquilinum**), orchard grass (**Dactylis glomerata***), birdfoot trefoil (**Lotus corniculatus***), red clover (**Trifolium pratense***), Queen Anne's lace (**Daucus carota***), common mullein (**Verbascum thapsus***), yarrow (**Achillea millefolium***) and arrow-leaved Aster (**Aster urophyllus**).

At least 15 species are recorded from here (1 tree, 2 shrubs, 12 herbs).

No significant species are recorded from this community.

P-p Dry - Dry Mesic: Older Coniferous Plantation

The several older coniferous plantations in the ANSI and its vicinity are up to submature-aged. The most extenive plantation lies on the eastern side of the Life Science ANSI and is included wholly within the Earth Science ANSI extension (3.37 ha.). This has developed in normal and warmer microclimates on dry to dry mesic loams.

The tree cover is closed to very closed and is predominately composed of eastern white pine (**Pinus strobus***) and Scotch pine (**P. sylvestris***), with occasional plantings of red pine (**P. resinosa***), jack pine (**P. banksiana***), white spruce (**Picea glauca***), Norway spruce (**P. abies***), and, very locally, tamarack (**Larix laricina***) and black walnut (**Juglans nigra***).

The shrub cover is open to semiopen, and includes gray dogwood (**Cornus foemina** subsp. **racemosa**), hawthorn (**Crataegus succulenta**), red choke cherry (**Prunus virginiana**) and others.

The dense overstory closure results in a semiopen to closed herb cover with a variety of those species of field communities, as well as occasional native species which are languishing from the lack of sunlight, such as orchard grass (**Dactylis glomerata***), creeping cinquefoil (**Potentilla simplex**), common enchanter's nightshade (**Circaea lutetiana**), heal-all (**Prunella vulgaris** var. **lancelolata**), white wild licorice (**Galium circaezans**) and arrow-leaved Aster (**Aster urophyllus**).

26 species are recorded here (10 trees, 6 shrubs, 10 herbs).

No significant species are recorded from this community.

P-d Dry Mesic- Mesic: Older Deciduous Plantation

This community occurs very locally within the Life Science ANSI (0.31 ha.), but presents a distinctive community structure with a tall, stately tree canopy and very open shrub stratum. The normal microclimate with dry mesic to mesic loam soils support a less xeric flora than the coniferous plantations.

The tree cover is semiclosed and is strongly dominated by plantings of black walnut (**Juglans nigra***), with infrequent butternut (**J. cinerea***) and eastern white pine (**Pinus strobus***), with naturally occurring, open grown trees of sugar maple (**Acer saccharum**).

The shrub cover is very open through grazing or management, and supports scattered staghorn sumac (**Rhus typhina**) and upland Virginia creeper (**Parthenocissus inserta**).

The herb cover includes many closed, old field species, such as Kentucky blue grass (**Poa pratensis**), rough-fruited cinquefoil (**Potentilla recta***), wild bergamot (**Monarda fistulosa**), arrow-leaved Aster (**Aster urophyllus**) and Canada goldenrod (**Solidago canadensis**).

Only 11 species were recorded here (4 trees, 2 shrubs, 5 herbs).

No significant species are recorded from this community.

PP PRAIRIE COMMUNITY

The 1977 discovery of a prairie of about 3.5 ha. surface area within the northern part of the study area by Maycock and Ball added a further significant natural vegetation community to the Oriskany Sandstone features. Such prairies once were more widespread in Ontario, but with changes in the climate over the past several thousand years, and the advent of human settlement over the past several decades, these became more restricted in distribution and size. The prospect of a relict prairie would be an important segment of the spectrum of natural features represented here. This prairie was located in the immediate vicinity of the proposed quarry development zone, apparently along the western half of the former clearing (Ball 1988), about UTM 859561, in the area presently excluded from the ANSI's boundaries (Figure 6, Map 1). The subsequent development of the quarry immediately adjacent to this area led to the destruction of this prairie. Except for the local concentrations of certain prairie species in the successional communities (X-p, see above), no other such features have been recorded within the ANSI or its vicinity (Ball 1988, Macdonald 1988, Sutherland

1989). This community is discussed below as a matter of record, and follows the descriptions of Ball (1977, 1988), Fahselt et al. (1977 a, 1979), Maycock (1977 a, 1988) and de Boer (1988).

PP Very Dry - Dry: Prairie Meadow

This prairie community presented a meadow-like feature with a generally semiclosed herb cover and scattered low shrubs. It occupied a warmer microclimatic situation with very dry to dry loamy soils. Maycock (1977.a) indicates within the community the presence of at least 29 species which are commonly associated with prairie habitats. In the 1988 investigation of the ANSI, Macdonald discovered only 2 such species remaining in the same area (Q-o, see above). However, several of these 'indicator' species were consistently recorded from the Oak Opening (F-0), and also from along the southerly-facing, dry, open sites of the forest fringes. Perhaps there is a relationship between these several communities, with those of the forest associations harbouring at least some prairie relicts, and being the source for further development of prairie features.

The shrub cover apparently was extremely open and local, and included hawthorn (**Crataegus chrysocarpa**), smooth sumac (**Rhus glabra**) and possibly northern dewberry (**Rhus flagellaris**).

The herb cover was semiclosed, possibly with local open sections, and presented a notable host of prairie species, with several apparently being 'important' members of the community, that is, occurring in such numbers and frequency as to be common within the vegetation cover. Those listed by Maycock and Ball were the following: big bluestem (**Andropogon gerardii**), broad-leaved panic grass (**Dichanthelium latifolium**), sedge (**Carex cephalophora**), clustred wood rush (**Luzula campestre**), prairie cinquefoil (**Potentilla arguta**), panicled tick-trefoil (**Desmodium paniculatum** var. **paniculatum**), Dillen's tick-trefoil (**D. paniculatum** var. **dillenii**), showy tick-trefoil (**D. canadense**), prostrate tick-trefoil (**D. rotundifolium**), round-headed bush-clover (**Lespedeza capitata**), wand-like bush-clover (**L. intermedia**), Virginia yellow flax (**Linum virginianum**), whorled milkwort (**Polygala verticillata**), racemed milkwort (**P. polygama**), Bicknell's frostweed (**Helianthemum bickneilii**), common pinweed (**Lechea intemedia**), early blue wood violet (**Viola palmata**), wild bergamot (**Monarda fistulosa**), clammy ground-cherry (**Physalis heterophylla**), small-flowered Agalinis (**Agalinis paupercula**), hairy beard-tongue (**Penstemon hirsutus**), hairy bedstraw (**Galium pilosum**), wild coffee (**Triosteum aurantiacum**), pale-spiked Lobelia (**Lobelia spicata** var. **hirtella**), smooth Aster (**Aster laevis**), downy white Aster (**A. pilosus** var. **pilosus**), sticky sweet everlasting (**Gnaphalium viscosum**), hairy goldenrod (**Solidago hispida**), gray-stemmed goldenrod (**S. nemoralis**) and heath Aster (**Virgulus ericoides**). Accompanying these were several of the more common meadow species and a few 'weedy' species.

45 species were recorded from this community (3 shrubs, 42 herbs).

4 provincially rare species were recorded here: Virginia yellow flax (**Linum virginianum**), early blue wood violet (**Viola palmata** var. **palmata**), prostrate tick-trefoil (**Desmodium rotundifolium**) and hairy bedstraw (**Galium pilosum**). The Virginia yellow flax is the only one of these species which has not been relocated elsewhere within the ANSI. Additionally, 7 regionally significant species were recorded here, including 2 shrubs: hawthorn (**Crataegus chrysocarpa**) and smooth sumac (**Rhus glabra**), and 5 herbs: prairie cinquefoil (**Potentilla arguta**), panicled tick-trefoil (**Desmodium paniculatum** var. **paniculatum**), small-flowered Agalinis (**Agalinis paupercula**), hairy beard-tongue (**Penstemon hirsutus**) and sticky sweet everlasting (**Gnaphalium viscosum**).

F UPLAND FOREST COMMUNITIES

The studies of Maycock and others concentrated mostly on those dry and dry mesic upland forests which were associated with the sandstone bedrock exposures, since it is these for which a similar environment is not expressed elsewhere in the province. While these drier communities superficially resemble those of clay and sand substrates, Maycock considered the expression of their community structure here to be quite distinctive. Additionally, the richness of their flora, both in species diversity and in species significance, reinforced this opinion.

14 upland forest communities are recognized within the ANSI, covering 182.07 ha., or 59.5% of the ANSI's total surface area. These generally span two groupings: dry forests dominated by oaks and hickories, and circummesic forests dominated by maples, oaks, ash and beech. Additionally there are several successional forest communities which have developed following cutting and other disturbances. These are briefly discussed below, are listed in Table 2, and are mapped in Figure 6 and Map 1.

F-0 (Very Dry) - Dry: Oak Opening

This community occurs in association with the dry oak - hickory forest (F-1, see below), in situations where there are openings in the tree canopy that are sufficiently large as to allow the herb cover to be relatively unshaded and the general environment to be somewhat more xeric than the surrounding forest (248 ha.). They typically occur in a warmer microclimate on dry loams, but local examples occur where the sandstone and limestone bedrocks lie only very shallowly beneath the surface, hence allowing the moisture regime to become very dry in some aspects. One large opening occurs to the south of the recent quarry development (about UTM 860558), and several other examples occur elsewhere (about UTMs 857560, 864557 and 862553). This community is notable because it supports a variety of nationally and provincially and regionally significant species, and includes several of those which were reported by Maycock and Ball (Fahselt 1977.a) to be characteristic of the former larger 'prairie' (PP, see above).

The tree cover here generally is open to semiclosed, although the large example presents a very open cover, and includes northern red oak (**Quercus rubra**), white oak (**Q. alba**), shagbark hickory (**Carya ovata**), bitternut hickory (**C. cordifolia**), large-toothed aspen (**Populus grandidentata**) and red maple (**Acer rubrum**).

The shrub cover is open to semiclosed with local concentrations of taller shrubs: smooth Juneberry (**Amelanchier laevis**), red choke cherry (**Prunus virginiana**), gray dogwood (**Cornus foemina** subsp. **racemosa**), and downy arrowwood (**Viburnum rafinesquianum**). There also is a generally sparse cover of lower shrubs: hillside blueberry (**Vaccinium pallidum**), velvet-leaved blueberry (**V. myrtilloides**) and wild snowberry (**Symphoricarpos albus**).

The herb cover is semiclosed to closed, and is generally characterized or dominated by eastern bracken fern (**Pteridium aquilinum**), ebony spleenwort (**Asplenium platyneuron**), poverty oat grass (**Danthonia spicata**), hairy panic grass (**Dichanthelium acuminatum**), broad-leaved panic grass (**D. latifolium**), narrow-leaved panic grass (**D. linearifolium**), sedge (**Carex pensylvanica**), wild lily-of-the-valley (**Maianthemum canadense**), sheep sorrel (**Rumex acetosella***), bastard toadflax (**Comandra umbellata**), barren strawberry (**Waldsteinia fragarioides**), creeping cinquefoil (**Potentilla simplex**), hog-peanut (**Amphicarpa bracteata**), pointed-leaved tick-trefoil (**Desmodium glutinosum**), panicled tick-trefoil (**D. paniculatum** var.

paniculatum), Dillen's tick-trefoil (**D. paniculatum** var. **dillenii**), spreading dogbane (**Apocynum androsaemifolium**), wild basil (**Satureja vulgaris**), wild bergamot (**Monarda fistulosa**), hairy bedstraw (**Galium pilosum**), yellow wild licorice (**G. lanceolatum**), arrow-leaved Aster (**Aster urophylla**), smooth Aster (**A. laevis**), smooth hawkweed (**Hieracium piloselloides***), ten-petalled sunflower (**Helianthus decapetalus**), white goldenrod (**Solidago bicolor**) and gray-leaved goldenrod (**S. nemoralis**).

A rich complement of 108 species is associated with this community (15 trees, 20 shrubs, 73 herbs).

2 nationally and provincially rare species occur in this community: prostrate tick-trefoil (**Desmodium rotundifolium**) and hairy bedstraw (**Galium pilosum**); indeed, this appears to be the preferred natural habitat here for the latter species. 8 regionally significant species are recorded: Pennsylvania raspberry (**Rubus pensilvanica**), common hair grass (**Deschampsia flexuosa**), Chinquapin oak (**Quercus muehlenbergii**), panicled tick-trefoil (**Desmodium paniculatum** var. **paniculatum**), long-bracted tick-trefoil (**D. cuspidatum**), Virginia mountain mint (**Pycnanthemum virginianum**), smooth small pussytoes (**Antennaria neodioica** subsp. **canadensis**) and a hybrid goldenrod (**Solidago canadensis** X **S. juncea**). Also of interest are 2 species which are characteristic of such dry, rich communities: hillside blueberry (**Vaccinium pallidum**) and possibly Maycock's record (1977 a) of poke milkweed (**Asclepias exaltata**).

F-1 Dry: Forest
Red Oak - White Oak - Shagbark Hickory

This is the most extensive community in the ANSI, in total covering about 17% of its surface area (52.39 ha.). The largest continuous stand is that lying south and west of the recent quarry clearance (about UTMs 856562 to 861559). Additionally, there are several other stands elsewhere in the ANSI (about UTMs 861547, 862562, 863551 and 865558). These stands range from subintermediate to submature in age classes, and have a canopy height of about 7 m. Their general environmental situations include warmer and normal microclimates with dry moisture regime and loam substrate which locally shallowly overlies the bedrock. These forests generally have not experienced severe disturbance in the past century, although there have been continuous, local light cutting and grazing. Fire probably was significant in the development of this community pattern. This community was studied by Maycock (Sites I and II in Fahselt et al. 1979), who noted the remarkable richness of its flora and the distinctive community structure of the species' association, and attributed these features directly to its association with the sandstone environment.

The tree cover of this community is semiclosed to semiopen, and is dominated by northern red oak (**Quercus rubra**), white oak (**Q. alba**) and shagbark hickory (**Carya ovata**), with a frequent presence of black oak (**Q. velutina**), bitternut hickory (**C. cordiformis**), red maple (**Acer rubrum**), large-toothed aspen (**Populus grandidentata**), black cherry (**Prunus serotina**) and eastern white pine (**Pinus strobus**).

The shrub cover is open to semiclosed, and generally is dominated by gray dogwood (**Cornus foemina** subsp. **racemosa**), downy arrowwood (**Viburnum rafinesquianum**), maple-leaved Viburnum (**V. acerifolium**), smooth Juneberry (**Amelanchier laevis**), red choke cherry (**Prunus virginiana**) and ironwood (**Ostrya virginiana**), with scattered occurrences of (**Symphoricarpos albus**) or velvet-leaved blueberry (**Vaccinium myrtilloides**).

The herb cover is semiclosed to semiopen, and its dominants include eastern bracken fern (**Pteridium aquilinum**), rough-leaved mountain rice (**Oryzopsis asperifolia**), sedge (**Carex pensylvanica**), wild lily-of-the-valley (**Maianthemum canadense**), white avens (**Geum canadense**), field strawberry (**Fragaria virginiana**), barren strawberry (**Waldsteinia fragarioides**), creeping cinquefoil (**Potentilla simplex**), pointed-leaved tick-trefoil (**Desmodium glutinosum**), Dillen's tick-trefoil (**D. paniculatum** var. **dillenii**), wild Geranium (**Geranium maculatum**), long-spurred violet (**Viola rostrata**), running strawberry-bush (**Euonymus obovatus**), wild sarsaparilla (**Aralia nudicaulis**), common enchanter's nightshade (**Circaea lutetiana**), spreading dogbane (**Apocynum androsaemifolium**), wild basil (**Satureja vulgaris**), common speedwell (**Veronica officinalis***), white wild licorice (**Galium circaezans**), blue-stemmed goldenrod (**Solidago caesia**), large-leaved Aster (**Aster macrophyllus**), arrow-leaved Aster (**A. urophyllus**), heart-leaved Aster (**A. cordifolia**) and others.

153 species[1] are recorded from his community (18 trees, 33 shrubs, 102 herbs).

4 nationally and provincially rare species are recorded from this community: yellow mandarin (**Disporum lanuginosum**, reported in Fahselt et al. 1979), American sweet chestnut (**Castanea dentata**, reported by Alex 1977), prostrate tick-trefoil (**Desmodium rotundifolium**, reported in Maycock 1977 b) and hairy bedstraw (**Galium pilosum**). 11 regionally significant species occur here: panicled tick-trefoil (**Lespedeza paniculatum** var. **paniculatum**), Pennsylvania raspberry (**Rubus pensilvanicus**), Chinquapin oak (**Quercus muehlenbergii**), sicklepod (**Arabis canadensis**), American wild plum (**Prunus americana**), hillside blueberry (**Vaccinium pallidum**), the non-native Morrow's honeysuckle (**Lonicera morrowi**) and, reported by Maycock (1977 a), bristly buttercup (**Ranunculus hispidus** var. **hispidus**), squawroot (**Conopholis americana**) and stickseed (**Hackelia deflexa** var. **americana**). Also of interest are local stands of bladdernut (**Staphylea trifoliata**). Several species which previously were reported by Maycock (1977 a) as being provincially rare are now delisted. However, 2 of these are reported to be rare in Central Region (Riley 1988): ebony spleenwort (**Asplenium platyneuron**) and smooth Solomon's-seal (**Polygonatum biflorum**), 2 are very uncommon within the Regional Municipality of Haldimand - Norfolk: bristly buttercup (**Ranunculus hispidus** var. **hispidus**) and sicklepod (**Arabis canadensis**), and 2 are of general floristic interest: poke milkweed (**Asclepias exaltata**), squawroot (**Conopholis americana**) and wild coffee (**Triosteum aurantiacum**). Finally, this appears to be the community which included running clubmoss (**Lycopodium clavatum**), a more northerly-occurring fern ally (Maycock 1977 a).

F-2 Dry: Disturbed Forest
Red Oak - White Oak - Trembling Aspen - Shagbark Hickory - Black Cherry

This community is related to the above forest, with the major difference being that it appears to have been disturbed in the past by cutting and access road development (3.73 ha.). It is located in the northwestern portion of the ANSI between Dry Lake Road and the recent quarry development (UTM 856560). It occupies a warmer microclimate with dry loam and rock substrates. A portion of this community may have been included by Maycock within his Site I (Fahselt et al. 1979).

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1. The total of 108 species indicated by Maycock's studies is not attributed solely to this community since his description may include oak opening (F-0) or the disturbed forest (F-2).

The tree cover is semiclosed to open, and includes northern red oak (**Quercus rubra**), white oak (**Q. alba**), trembling aspen (**Populus tremuloides**), shagbark hickory (**Carya ovata**) and black cherry (**Prunus serotina**), with very occasional Chinquapin oak (**Q. muehlenbergii**), eastern white pine (**Pinus strobus**) and naturally occurring black walnut (**Juglans nigra**).

The shrub cover is open to semiclosed, and is dominated by gray dogwood (**Cornus foemina** subsp. **racemosa**), red choke cherry (**Prunus virginiana**) and hawthorn (**Crataegus** species).

The herb cover is open to semiclosed, with its dominants being eastern bracken fern (**Pteridium aquilinum**), Kentucky blue grass (**Poa pratensis**), sedges (**Carex communis, C. pensylvanica**), wild lily-of-the-valley (**Maianthemum canadense**), field strawberry (**Fragaria virginiana**), spreading dogbane (**Apocynum androsaemifolium**), wild bergamot (**Monarda fistulosa**), common speedwell (**Veronica officinalis***), white wild licorice (**Galium circaezans**), large-leaved Aster (**Aster macrophyllus**), arrow-leaved Aster (**A. urophyllus**), gray-stemmed goldenrod (**Solidago nemoralis**) and woodland sunflower (**Helianthus divaricatus**).

64 species are recorded here (13 trees, 13 shrubs, 38 herbs).

4 regionally significant species are recorded from this community, including 3 natives: common polypody (**Polypodium virginianum**), Chinquapin oak (**Quercus muehlenbergii**) and panicled tick-trefoil (**Desmodium paniculatum** var. **paniculatum**), and probably the non-native soft chess (**Bromus mollis***, Ball 1977). Of interest are 2 dry site native species: wand-like bush-clover (**Lespedeza intermedia**) and possibly poke milkweed (**Asclepias exaltata**, Maycock 1977 a).

F-3 Dry - Dry Mesic Forest
Red Oak - Bitternut Hickory - White Pine - Chinquapin Oak - Red Maple - White Oak

This community is restricted to the northeastern portion of the ANSI (UTM 863565; 3.21 ha.). It presents a submature, oak-dominated canopy which includes eastern white pine and yellow oak - a community pattern which was not recorded elsewhere in the study area, and which appears to be a naturally occurring vegetation feature. Its environmental conditions include a warmer to normal microclimate with dry to dry mesic moisture regimes and a loam and shallow rock substrate. It extends up to the rim of the Onondaga Escarpment in the southern edge of the stand, but has suffered severe cutting in the past three years in its northern portion (see F-10).

The tree cover is closed to semiopen, and is dominated by submature trees of northern red oak (**Quercus rubra**), bitternut hickory (**Carya cordiformis**), eastern white pine (**Pinus strobus**), Chinquapin oak (**Quercus muehlenbergii**), red maple (**Acer rubrum**) and white oak (**Quercus alba**). As well, included in this canopy are black oak (**Quercus velutina**), bur oak (**Q. macrocarpa**), shagbark hickory (**Carya ovata**) and others.

The shrub cover is semiopen to semiclosed, and presents a general codominance of gray dogwood (**Cornus foemina** subsp. **racemosa**), black cherry (**Prunus serotina**), red choke cherry (**P. virginiana**), ironwood (**Ostrya virginiana**), blue beech (**Carpinus caroliniana**) and downy arrowwood (**Viburnum rafinesquianum**).

The herb cover is open to semiclosed, and includes among its important species the following: northeastern lady fern (**Athyrium filix-femina**), eastern bracken fern (**Pteridium aquilinum**), rough-leaved mountain rice (**Oryzopsis asperifolia**), tall false Solomon's-seal (**Smilacina racemosa**), field strawberry (**Fragaria virginiana**), white avens (**Geum canadense**), wild Geranium (**Geranium maculatum**), running strawberry-bush (**Euonymus obovatus**), common enchanter's nightshade (**Circaea lutetiana**) and blue-stemmed goldenrod (**Solidago caesia**).

44 species occur here (15 trees, 13 shrubs, 16 herbs).

The 1 regionally significant species is recorded from this community, Chinquapin oak (**Quercus muehlenbergii**). It occurs in a notable abundance in the tree canopy as profusely fruiting, submature trees.

F-4 Dry - Mesic: Sink Hole Mosaic Forest
Red Oak - White Oak - Red Maple - Sugar Maple - Black Cherry - Large-toothed Aspen - American Beech

This rather eclectic community complex is significant in being associated with the several small sinkhole features which occur throughout the ANSI. This terrain is characterized by a shallowly-soiled sandstone bedrock which has undergone the collapse of its supporting strata, resulting in frequent to occasional depressions of up to 2 m in depth. Many of these collapsed features also lead to narrow 'caverns' which extended well under the surrounding sandstone and limestone pavements. These depressions harbour somewhat less xeric conditions, allowing several more mesic species to occur in the various strata among the generally drier species. The warmer and normal microclimates here have dry to mesic rock and loam substrate conditions. It is also possible that the caverns may provide suitable natural hibernacula or denning sites for the Black Rat Snakes which occur in the ANSI. 2 portions within the ANSI support these features: very locally to the southwest of the recent quarry development (UTM 856559) and, by far the larger example of the feature, the forests occurring to the southeast of the intersection of Dry Lake and Town Line Roads (UTM 862552). These 2 sinkhole features appear to be undisturbed by the original quarrying activities of the past 80 years or earlier. This is surprising, since they would have been readily available for such extraction. Perhaps such features actually were more common prior to quarrying, possibly along the north side of Town Line Road.

The tree cover is closed to semiclosed, and is dominated by northern red oak (**Quercus rubra**), white oak (**Q. alba**), sugar maple (**Acer saccharum**), red maple (**Acer rubrum**), black cherry (**Prunus serotina**) and large-toothed aspen (**Populus grandidentata**), with scattered American beech (**Fagus grandifolia**) and white ash (**Fraxinus americana**). The maples and beech tend to be restricted to the more mesic sinkholes, while the others are on the drier pavements.

The shrub cover is semiopen to semiclosed, and generally is dominated by maple-leaved Viburnum (**Viburnum acerifolium**), downy arrowwood (**V. rafinesquianum**), smooth Juneberry (**Amelanchier laevis**) and ironwood (**Ostrya virginiana**), with a lower shrub cover that includes velvet-leaved blueberry (**Vaccinium myrtilloides**) and wild snowberry (**Symphoricarpos albus**).

The herb cover is semiopen to closed, and is characterized by the presence of eastern bracken fern (**Pteridium aquilinum**), rough-leaved mountain rice (**Oryzopsis asperifolia**), woodland Poa (**Poa alsodes**), false melic grass (**Schizachne purpurescens**), hairy panic grass (**Dichanthelium acuminatum**), wild lily-of-the-valley (**Maianthemum**

canadense), tall false Solomon's-seal (**Smilacina racemosa**), blue cohosh (**Caulophyllum thalictroides**), wild Geranium (**Geranium maculatum**), barren strawberry (**Waldsteinia fragarioides**), pointed-leaved tick-trefoil (**Desmodium glutinosum**), wild sarsaparilla (**Aralia nudicaulis**), white wild licorice (**Galium circaezans**), large-leaved Aster (**Aster macrophyllus**) and blue-stemmed goldenrod (**Solidago caesia**).

73 species occur within this community (12 trees, 14 shrubs, 47 herbs).

3 nationally and provincially rare species are recorded here: hairy bedstraw (**Galium pilosum**), yellow mandarin (**Disporium lanuginosum**) and possibly early blue wood violet (**Viola palmata** var. **palmata**, de Boer 1988). As well, 2 regionally significant species occur: common hairgrass (**Deschampsia flexuosa**) and sicklepod (**Arabis canadensis**). Also of interest is the presence of wand-like bush-clover (**Lespedeza intermedia**) which is rare in Central Region (Riley 1988).

F-5 Dry Mesic Forest
Red Oak - White Oak - Sugar Maple

This community occurs within the ANSI as several discrete stands of young to intermediate age class forests (1.71 ha.). They generally are situated along slight slopes, possibly where the sandstone bedrock exposures are covered by a slightly thicker soil cover. These dry mesic loam site types occur under warmer and normal conditions. This community may correspond to Maycock's Site II (Fahselt et al. 1979). It appears to form a transition between the dry oak - hickory forests (F-1) and the mesic maple - oak - ash - beech forests (F-11). The largest and best stand of this community lies to the north of the recent quarry clearance (UTM 858563). Others occur around the oak - hickory forests at UTMs 857556, 859554, 859556, 861557 and 863556.

The tree cover here is closed to semiclosed, and is dominated by northern red oak (**Quercus rubra**), white oak (**Q. alba**) and sugar maple (**Acer saccharum**), with a lesser presence of red maple (**A. rubrum**), black cherry (**Prunus serotina**) and others.

The shrub cover is semiopen to semiclosed, and has a frequent occurrence of gray dogwood (**Cornus foemina** subsp. **racemosa**), red choke cherry (**Prunus virginiana**), downy arrowwood (**Viburnum rafinesquianum**), maple-leaved Viburnum (**V. acerifolium**) and ironwood (**Ostrya virginiana**). Additionally, there are very local eastern flowering dogwood (**Cornus florida**) and velvet-leaved blueberry (**Vaccinium myrtilloides**).

The herb cover is open to semiopen, with its dominants and characteristic species being eastern bracken fern (**Pteridium aquilinum**), sedges (**Carex pensylvanica, C. radiata**), wild lily-of-the-valley (**Maianthemum canadense**), tall false Solomon's-seal (**Smilacina racemosa**), downy Solomon's-seal (**Polygonatum pubescens**), white avens (**Geum canadense**), pointed-leaved tick-trefoil (**Desmodium glutinosum**), wild Geranium (**Geranium maculatum**), downy-stemmed yellow violet (**Viola pubescens** var. **pubescens**), running strawberry-bush (**Euonymus obovatus**), common enchanter's nightshade (**Circaea lutetiana**), white wild licorice (**Galium circaezans**), blue-stemmed goldenrod (**Solidago caesia**) and heart-leaved Aster (**Aster cordifolius**).

57 species occur here (12 trees, 11 shrubs, 34 herbs).

1 nationally and provincially rare species is recorded to occur here; yellow mandarin (**Diosporum lanuginosum**). As well, only 1 regionally significant species is recorded: common hairgrass (**Deschampsia flexuosa**), and of interest is wand-like bush-clover (**Lespedeza intermedia**) which is rare in Central Region (Riley 1988).

F-6 Dry Mesic: Successional Forest Complex Sugar Maple - Red Oak - White Oak - Shagbark Hickory - White Ash - Large-toothed Aspen

This community complex presents a rather eclectic species complement, and is best charcterized as being a successional maple - oak - hickory forest of young to subintermediate age classes which appears to have resulted from select tree harvesting in the less xeric phases of the oak - hickory community (F-1). It occupies normal and warmer microclimatic situations of dry mesic rock and loam substrates. The largest stand occurs to the southeast of the recent quarry development (UTMs 862557 to 863564), and others are at the ANSI's western edge (UTM 854558) and at its eastern edge (UTM 870555; 15.0 ha.).

The tree cover is variable in closure, being from semiclosed to locally open, and does not present a clear pattern of dominance across the ANSI. It typically includes sugar maple (**Acer saccharum**), northern red oak (**Quercus rubra**), white oak (**Q. alba**), shagbark hickory (**Carya ovata**), white ash (**Fraxinus americana**) and large-leaved aspen (**Populus grandidentata**) in the canopy. These may be accompanied by scattered red maple (**Acer rubrum**), eastern white pine (**Pinus strobus**), black cherry (**Prunus serotina**) or paper birch (**Betula papyrifera**).

The shrub cover generally is semiclosed to semiopen, and is dominated by red choke cherry (**Prunus virginiana**), gray dogwood (**Cornus foemina** subsp. **racemosa**) and maple-leaved Viburnum (**Viburnum acerifolium**), with infrequent fire cherry (**Prunus pensylvanica**), smooth Juneberry (**Amelanchier laevis**), downy arrowwood (**Viburnum rafinesquianum**), wild red raspberry (**Rubus idaeus** var. **strigosus**) and downy glaucous honeysuckle (**Lonicera dioica** var. **orientalis**).

The herb cover generally is semiopen to very open, and tends to include a variety of woodland species, including eastern bracken fern (**Pteridium aquilinum**), rough-leaved mountain rice (**Oryzopsis asperifolia**), sedges (**Carex pensylvanica, C. arctata, C. pedunculata**), white avens (**Geum canadense**), pointed-leaved tick-trefoil (**Desmodium glutinosum**), wild Geranium (**Geranium maculatum**), running strawberry-bush (**Euonymus obovatus**), common enchanter's nightshade (**Circaea lutetiana**), downy-stemmed yellow violet (**Viola pubescens** var. **pubescens**), white wild licorice (**Galium circaezans**), partridge berry (**Mitchella repens**), large-leaved Aster (**Aster macrophylla**) and blue-stemmed goldenrod (**Solidago caesia**).

115 species occur in this community (20 trees, 24 shrubs, 71 herbs).

Sutherland (1989) reports a stand of the nationally and provincially rare American columbo (**Frasera caroliniensis**) from the northwestern stand of this community (UTM 863558). As well, there are 3 regionally significant species which occur here: the native Pennsylvania raspberry (**Rubus pensilvanicus**), Chinquapin oak (**Quercus muehlenbergii**) and, growing in a small moist depression, crested woodfern (**Dryopteris cristata**). Also of interest in the eastern stand are very local sprays of wand-like bush-clover (**Lespedeza intermedia**) which Riley (1988) reports as being rare in Central Region.

F-7 Dry Mesic (- Mesic): Successional Forest
Red Oak - Sugar Maple - Bitternut Hickory - Shagbark Hickory - White Ash

This is a successional forest community which is restricted to the northeastern corner of the ANSI (UTM 863566). It is situated on the middle and lower slopes of the Onondaga Escarpment, and presents dry mesic to mesic rock and loam substrates in a normal microclimate. It has been disturbed by past cutting which has greatly modified the former natural community structure (3.21 ha.).

The tree cover is semiclosed to semiopen, and is dominated by northern red oak (**Quercus rubra**), sugar maple (**Acer saccharum**), bitternut hickory (**Carya cordiformis**), shagbark hickory (**C. ovata**) and white ash (**Fraxinus americana**), with eastern white pine (**Pinus strobus**) and others.

The shrub cover is semiclosed to closed, and has as its dominant species gray dogwood (**Cornus foemina** subsp. **racemosa**), red choke cherry (**Prunus virginiana**), black cherry (**P. serotina**) and ironwood (**Ostrya virginiana**).

The herb cover is semiopen to open with an eclectic complement which includes woodland Poa (**Poa alsodes**), sedge (**Carex cephalanthus**), wild lily-of-the-valley (**Maianthemum canadense**), tall false Solomon's-seal (**Smilacina racemosa**), white avens (**Geum canadense**), common enchanter's nightshade (**Circaea lutetiana**), common speedwell (**Veronica officinalis***) and arrow-leaved Aster (**Aster urophyllus**).

29 species are recorded from this community (12 trees, 4 shrubs, 13 herbs).

1 regionally significant species is recorded here: Chinquapin oak (**Quercus muehlenbergii**).

F-8 Dry Mesic (- Mesic): Successional Forest
Bigtooth Aspen - Red Oak - Red Maple - Shagbark Hickory - White Oak

This is an earlier successional phase following cutting, in which aspen has become the dominant species, but those tree species which were not removed still contribute to the canopy (6.82 ha.). It differs from the successional grove community (X-g) in having a notably closer affinity to the forest, rather than to any adjacent field. The stands occur along the woodland margins in several portions of the ANSI (UTMs 856563, 866541 and 867546). Its site type characteristics are a normal to warmer microclimate, with dry mesic to mesic moisture regimes and loam soils.

The tree cover is semiclosed, and is dominated by large-toothed aspen (**Populus grandidentata**), with a variable presence of other tree species of the adjacent forests, such as northern red oak (**Quercus rubra**), red maple (**Acer rubrum**), shagbark hickory (**Carya ovata**) and white oak (**Q. alba**).

The shrub cover is semiopen, and generally is dominated by ironwood (**Ostrya virginiana**), black raspberry (**Rubus occidentalis**), red choke cherry (**Prunus virginiana**) and smooth Juneberry (**Amelanchier laevis**).

The herb cover is semiclosed to semiopen, and generally is dominated by a variety of upland forest species, such as eastern bracken fern (**Pteridium aquilinum**), sedges (**Carex rosea, C. pensylvanica**), tall false Solomon's-seal (**Smilacina racemosa**), wild lily-of-the-valley (**Maianthemum canadense**), thimbleweed (**Anemone virginiana**), pointed-leaved tick-trefoil (**Desmodium glutinosum**), wild Geranium (**Geranium maculatum**), downy-stemmed yellow violet (**Viola pubescens** var.

pubescens), white wild licorice (**Galium circaezans**), Canada goldenrod (**Solidago canadense**), blue-stemmed goldenrod (**S. caesia**) and broad-leaved Aster (**Aster macrophyllus**).

Only 37 species are recorded from this community (9 trees, 6 shrubs, 12 herbs).

No significant species are recorded from here.

F-9 Dry Mesic - Mesic Forest
Red Maple - Red Oak - White Oak - Sugar Maple - American Beech - Shagbark Hickory - Bitternut Hickory - White Pine

The forest which lies along the base of the Onondaga Escarpment at UTM 865563 is notable in its tree composition and age class (7.5 ha.). This is an intermediate to submature community for which the canopy species reflect both the drier and circummesic sites. This is due to the locally rolling terrain which includes local spring swamps, and may sustain some seepage from the adjacent escarpent slope. The dry mesic to mesic loams here occur in a normal microclimatic situation.

The tree cover is closed to semiclosed, and is dominated by an broad spectrum of species, notably red maple (**Acer rubrum**), northern red oak (**Quercus rubra**), white oak (**Q. alba**), sugar maple (**Acer saccharum**), American beech (**Fagus grandifolia**), shagbark hickory (**Carya ovata**), bitternut hickory (**C. cordiformis**) and eastern white pine (**Pinus strobus**).

The shrub cover generally is semiclosed, and includes ironwood (**Ostrya virginiana**), blue beech (**Carpinus caroliniana**), red choke cherry (**Prunus virginiana**) and maple-leaved Viburnum (**Viburnum acerifolium**).

The herb cover is semiopen to semiclosed, and is dominated and characterized by the presence of eastern bracken fern (**Pteridium aquilinum**), sedge (**Carex pensylvanica**), wild lily-of-the-valley (**Maianthemum canadense**), barren strawberry (**Waldsteinia fragarioides**), wild Geranium (**Geranium maculatum**), running strawberry-bush (**Euonymus obovatus**), golden alexanders (**Zizia aurea**), partridge-berry (**Mitchella repens**) and large-leaved Aster (**Aster macrophyllus**).

49 species occur here (14 trees, 11 shrubs, 24 herbs).

3 provincially rare species are reported by Reznicek (1989), Fahselt et al. (1979) and others to occur within this notable forest environment: sedge (**Carex gracilescens**), American columbo (**Frasera caroliniensis**) and yellow mandarin (**Disporum lanuginosum**); however, only the last-named species could be relocated by Macdonald during the 1988 inventory of the ANSI. Regionally significant species here include Chinquapin oak (**Quercus muehlenbergii**) and American columbo which is also considered to be regionally rare by Sutherland (1987).

F-10 Dry Mesic - Mesic Successional Forest
Sugar Maple - Bitternut Hickory - White Ash

This forest occurs along and back from the crest of the Onondaga Escarpment, and is restricted to the northeastern corner of the ANSI (UTM 863562; 3.15 ha.).

It is a successional community which has undergone considerable cutting in the past 3 years, with the removal of several species, probably northern red oak (**Quercus rubra**) and shagbark hickory (**Carya ovata**). The presence of Chinquapin oak (**Quercus muehlenbergii**), indicates that community F-3 is its probable precursor. The loam soils of this community are dry mesic to mesic, and are situated in normal and warmer microclimates.

The tree cover is semiopen due to the cutting, but still includes large trees of sugar maple (**Acer saccharum**), bitternut hickory (**Carya cordiformis**) and white ash (**Fraxinus americana**).

The shrub cover is semiopen to semiclosed, and presents both remnant and successional species, notably ironwood (**Ostrya virginiana**), black cherry (**Prunus serotina**), wild choke cherry (**P. virginiana**), hawthorn (**Crataegus** species) and black raspberry (**Rubus occidentalis**).

The dominant species recorded here in the semiopen herb cover include sedge (**Carex rosea**), white avens (**Geum canadense**), black medick (**Medicago lupulina**), common enchanter's nightshade (**Circaea lutetiana**) and common mullein (**Verbascum thapsus***).

18 species are recorded from here (5 trees, 6 shrubs, 7 herbs).

Only 1 regionally significant species is recorded here: Chinquapin oak (**Quercus muehlenbergii**).

F-11 Mesic Forest
Sugar Maple - Red Oak - White Ash - American Beech

This community is typical of the circummesic forests of the region. Its age classes vary from subintermediate to intermediate, and its site characteristics are normal microclimate, mesic moisture regime and loam soil. Within the ANSI it is located in the southern arm on the sandy loams of the low ridges about the Dry Lake Basin (about UTMs 865541 and 866545), and elsewhere (UTMs 853554, 856555, 862550 and 862556), occupying 36.67 ha., or almost 12% of its total surface area. This community generally has been subjected to cutting in the past, with recent activity along the north side of Town Line Road; however, a relatively good example occurs in the ANSI's southern arm, to the southeast of the intersection of Dry Lake and Town Line Roads (UTM 862550).

The tree cover is closed to semiopen, and has as its dominants sugar maple (**Acer saccharum**), northern red oak (**Quercus rubra**), white ash (**Fraxinus americana**) and American beech (**Fagus grandifolia**), accompanied by lesser importances of American basswood (**Tilia americana**), eastern white pine (**Pinus strobus**), large-toothed aspen (**Populus grandidentata**) and others.

The shrub cover is open to semiclosed, with a decided dominance of ironwood (**Ostrya virginiana**), red choke cherry (**Prunus virginiana**) and smooth Juneberry (**Amelanchier laevis**), accompanied by maple-leaved Viburnum (**Viburnum acerifolium**), wild red raspberry (**Rubus idaeus**), red-berried elder (**Sambucus pubens**), gray dogwood (**Cornus foemina** subsp. **racemosa**) and others.

The herb cover generally is semiopen, and is dominated and characterized by the presence of a variety of typical mesic upland forest species, such as spinulose woodfern (**Dryopteris carthusiana**), rattlesnake fern (**Botrychium virginianum**), sedges (**Carex blanda, C. pedunculata, C. hitchcockiana**), tall false Solomon's-seal

(**Smilacina racemosa**), wild lily-of-the-valley (**Maianthemum canadense**), yellow trout-lily (**Erythronium americanum**), white avens (**Geum canadense**), pointed-leaved tick-trefoil (**Desmodium glutinosum**), wild Geranium (**Geranium maculatum**), smooth-stemmed yellow violet (**Viola pubescens** forma **leiocarpa**), long-spurred violet (**V. rostrata**), common enchanter's nightshade (**Cirsium lutetiana**), common black snakeroot (**Sanicula marilandica**), white wild licorice (**Galium circaezans**), large-leaved Aster (**Aster macrophyllus**), blue-stemmed goldenrod (**Solidago caesia**) and Canada goldenrod (**S. canadensis**).

141 species occur in this community across the ANSI (20 trees, 29 shrubs, 92 herbs).

2 nationally and provincially rare species are recorded from here: yellow mandarin (**Disporum lanuginosum**) and early blue wood violet (**Viola palmata** var. **palmata**, collected by Phipps). Additionally, 3 regionally significant native shrubs occur here: hawthorn (**Crataegus holmesiana**), Pennsylvania raspberry (**Rubus pensilvanica**) and dwarf Juneberry (**Amelanchier sanguinea**), and the first record for Ontario of a lichen species (**Cladonia cylindrica**) is reported by Fahselt (1980). Of interest are 2 southern species which formerly were listed as being provincially rare, but are now delisted: American wild plum (**Prunus americana**) and Canada brome grass (**Bromus pubescens**).

F-12 Mesic Managed Forest
Sugar Maple - (Red Ash - White Ash)

This community is derived from the above forest (F-11) through generally intensive and selective removal of all but sugar maple from the canopy (27.02 ha.). It is managed for sugar maple syrup production, particularly evident in those of the southern margin of the ANSI, and for timber production. It occurs in 3 general portions of the study area, to the east of Dry Lake (about UTMs 867541 to 871548), along the low western escarpment (UTMs 852552 to 856662) and in a basin at the foot of the Onondaga Escarpment (UTM 845636). Its mesic loams occupy a normal microclimate.

The tree cover is closed to semiclosed, and the most strongly dominant species is sugar maple (**Acer saccharum**), often making up over 80% of the canopy. This is accompanied by remnants of the former canopy cover: northern red oak (**Quercus rubra**), white ash (**Fraxinus americana**), black cherry (**Prunus serotina**) and shagbark hickory (**Carya ovata**).

The shrub cover is generally open to locally closed, but has no clear dominants. Occurring here are wild choke cherry (**Prunus virginiana**), gray dogwood (**Cornus foemina** subsp. **racemosa**), red-berried elder (**Sambucus pubens**), pasture gooseberry (**Ribes cynosbati**), wild red raspberry (**Rubus idaeus** var. **strigosus**) and many others.

The herb cover has a very open to locally semiclosed structure, and generally is quite sparse. The dominant and characteristic species include rattlesnake fern (**Botrychium virginianum**), spinulose woodfern (**Dryopteris carthusiana**), bearded shorthusk (**Brachyeletrum erectum**), false melic grass (**Schizachne purpurascens**), sedges (**Carex pensylvanica, C. radiata, C. blanda,** C **rosea**[1]), wild lily-of-the-valley (**Maianthemum canadense** including the downy variety **interius** of this species), hairy Solomon's-seal (**Polygonum pubescens**), tall false Solomon's-seal (**Smilacina racemosa**), Indian cucumber (**Medeola virginiana**), large-flowered white Trillium (**Trillium grandiflorum**), white avens (**Geum canadense**), herb-Robert (**Geranium robertianum**),

1. Older floristic texts refer to this species as **C. convoluta**.

common enchanter's nightshade (**Circaea lutetiana**), white wild licorice (**Galium circaezans**), cleavers (**G. aparine**, apparently quite common in the groundcover during the spring), arrow-leaved Aster (**Aster urophyllus**), large-leaved Aster (**A. macrophyllus**) and blue-stemmed goldenrod (**Solidago caesia**).

126 species are recorded from this community (18 trees, 24 shrubs, 84 herbs).

1 nationally and provincially rare species occurs here: yellow mandarin (**Disporum lanuginosum**). Also, only 1 regionally significant fern was recorded: common polypody (**Polypodium virginianum**). Of interest is the presence of several southerly species which formerly were considered to be provincially rare: cut-leaved avens (**Geum laciniatum**), American wild plum (**Prunus americana**) and eastern flowering dogwood (**Cornus florida**), last of which is restricted in Central Region (Riley 1988).

F-13 Dry Mesic - Wet Mesic: Successional Forest Complex Bitternut Hickory - Shagbark Hickory - White Oak - White Ash - Hawthorn

This successional community complex is restricted to the northern fringe of the Dry Lake basin (UTM 863548; 6.52 ha.). The gently rolling terrain of this area presents a complex of mesic upland sites and wet mesic lowland sites. There are local spring swamps (L-4, see below) throughout the community, and the water table appears to be relatively high, at least seasonally. Its site type characteristics are normal microclimate, dry mesic to wet mesic moisture regime and loam substrate. Past and recent cutting has added to the confusion among the component species here.

The tree cover generally is closed to semiclosed, and there are greatly variable dominances in the canopy. Characteristic species include a frequent presence of bitternut hickory (**Carya cordiformis**), shagbark hickory (**C. ovata**), white oak (**Quercus alba**) and white ash (**Fraxinus americana**), with lesser occurrances of large-toothed aspen (**Populus grandidentata**), red maple (**Acer rubrum**), silver maple (**A. saccharinum**) and others.

The shrub cover generally is semiopen to open, but locally with closed thickets occurring where tree cover is more open. It is dominated by hawthorn (**Crataegus** species), blue beech (**Carpinus caroliniana**), prickly ash (**Zanthoxylum americanum**) or gray dogwood (**Cornus foemina** subsp. **racemosa**).

The herb cover is open to semiclosed, and has a poorly delineated complement of dominants which include sedges (**Carex pedunculata, C. gracillima**), white avens (**Geum canadense**), field strawberry (**Fragaria virginiana**), wild Geranium (**Geranium maculatum**), smooth-stemmed yellow violet (**Viola pubescens** forma **leiocarpa**), common enchanter's nightshade (**Circaea lutetiana**), heal-all (**Prunella vulgaris** var. **lanceolata**), large-leaved Aster (**Aster macrophyllus**) and Canada goldenrod (**Solidago canadensis**).

64 species are recorded from here (15 trees, 11 shrubs, 38 herbs).

No regionally significant species are recorded here; however, there are several interesting occurrences of a hybrid lowland maple (**Acer saccharinum** X **A. rubrum**), and the Michigan lily (**Lilium michiganense**).

L LOWLAND COMMUNITIES

Lowland communities within the ANSI include those forests, thickets and meadows which have wet mesic to saturated moisture regimes, but are not directly associated with the more open wetlands in the immediate vicinity of Dry Lake. They tend to be concentrated as relatively large units in the southern arm of the ANSI, lying just north of the Dry Lake Basin. Additionally, there are several small spring swamps and 'slough' depressions located in the northeastern portion of the area. Similar sloughs are of the landforms and vegetational features which are characteristic of the Haldimand Clay Plain, and their presence in the ANSI indicates its affinity to that physiographic region. Together, the 8 lowland communities cover 25.0 ha., or 8.17% of ANSI's total surface area. These are listed in Table 2, discussed below and mapped in Map 1 and Figure 6.

L-1 Wet Mesic: Disturbed Lowland Forest Green Ash - Shagbark Hickory - Swamp White Oak - Red Maple - Trembling Aspen

This community occurs as 4 forested areas which have developed in a normal microclimatic situation on the wet mesic loams just north of the Dry Lake Basin (UTMs 863544, 865543, 864547 and 865547) surrounding the larger swamp forest (L-2; 5.48 ha.). These stands have been cut in the recent past, and they tend to have a subintermediate to young age classes. Many features of their community structure and species composition indicate a successional situation.

The tree cover is semiclosed to closed, and generally is dominated by green ash (**Fraxinus pennsylvanica** var. **subintegerrima**), shagbark hickory (**Carya ovata**), swamp white oak (**Quercus bicolor**), silver maple (**Acer saccharinum**) and trembling aspen (**Populus tremuloides**).

The shrub cover is semiopen to closed, and includes a variety of lowland species, such as hawthorn (**Crataegus succulenta**), gray dogwood (**Cornus foemina** subsp. **racemosa**), narrow-leaved meadowsweet (**Spiraea alba**), red choke cherry (**Prunus virginiana**), winterberry (**Ilex verticillata**), nannyberry (**Viburnum lentago**) and others.

The herb cover is open to semiclosed, and is dominated and characterized by fowl meadow grass (**Glyceria striata**), rice cut grass (**Leersia oryzoides**), sedges (**Carex intumescens, C. albursina**), bristly greenbriar (**Smilax tamnoides** var. **hispida**), wild yam (**Dioscorea villosa**), jumpseed (**Polygonum virginianum**), small-flowered buttercup (**Ranunculus abortivus**), yellow avens (**Geum allepicum**), running strawberry-bush (**Euonymus obovatus**), long-spurred violet (**Viola rostrata**), common enchanter's nightshade (**Circaea lutetiana**), water-parsnip (**Sium suave**), tufted loosestrife (**Lysimachia thyrsiflora**), heal-all (**Prunella vulgaris** var. **lanceolata**), pasture bedstraw (**Galium trifidum**), cleavers (**G. aparine**), calico Aster (**Aster lateriflora**) and panicled Aster (**A. lanceolata**).

There are 80 species which are associated with this community (11 trees, 22 shrubs, 57 herbs).

1 nationally and provincially rare species is recorded in this community: southern arrowwood (**Viburnum recognitum**). This and the adjacent lowland forest (L-2) are the only stations for this species in the ANSI, and the population occurs as 3 small groups of shrubs along the fringe of the larger swamp forest, and the plants appear to be quite overshaded by the forest canopy. Additionally, 3 regionally significant

herbs are recorded: Pennsylvania raspberry (**Rubus pensilvanicus**), sedge (**Carex projecta**) and water pimpernel (**Samolus parviflorus**). Also of interest are several species which Riley regards to be rare or restricted in Central Region: swamp white oak (**Quercus bicolor**, which forms local concentrations to the south of the larger swamp forest), wild yam (**Dioscorea villosa**) and jumpseed (**Polygonum virginianum**).

L-g Wet Mesic - Wet: Slough Fringe Grove
Silver Maple - Green Ash - Swamp White Oak - White Elm - Willow

This community is associated with the slough depressions, around which it forms narrow, marginal zones (1.13 ha.). These wet mesic to wet loams, which occur in a normal microclimate, support several species which characterize this situation, notably the swamp white oak and prickly dewberry. They are located in both the southern and northeastern portions of the ANSI (UTMs 863545, 864546, 864563 and 865564).

The tree cover is semiopen to semiclosed, and is dominated by silver maple (**Acer saccharinum**), green ash (**Fraxinus pennsylvanica** var. **subintegerrima**) and locally by swamp white oak (**Quercus bicolor**), and are accompanied by white elm (**Ulmus americana**), crack willow (**Salix fragilis** var. **fragilis***) and black willow (**S. nigra**).

The shrub cover is open, but there are no clear dominants. The species here include narrow-leaved meadowsweet (**Spiraea alba**), winterberry (**Ilex verticillata**), highbush blueberry (**Vaccinium corymbosum**) and climbing poison ivy (**Toxicodendron radicans** var. **radicans**).

The herb cover is semiopen to semiclosed, and is dominated by sensitive fern (**Onoclea sensibilis**), fowl meadow grass (**Glyceria striata**), sedge (**Carex intumescens**), northern bugleweed (**Lycopus uniflora**) and leafy beggar's-ticks (**B. frondosa**), with a lesser presence of marsh fern (**Thelypteris palustris** var. **pubescens**), bristly greenbriar (**Smilax tamnoides** var. **hispida**), northern blue flag (**Iris versicolor**), prickly dewberry (**Rubus hispidus**), tufted loosestrife (**Lysimachia thyrsiflora**), mad-dog skullcap (**Scutellaria lateriflora**) and nodding beggar's-ticks (**Bidens cernua**).

31 species are recorded from this community (12 trees, 4 shrubs, 15 herbs).

No significant species are recorded here, although of interest is the presence of the southern swamp white oak (**Quercus bicolor**) which Riley (1988) indicates as being restricted within Central Region.

L-2 Wet: Swamp Forest
Silver Maple - Green Ash - White Elm - Swamp White Oak

This is the most extensive of the lowland communities in the ANSI. It occupies the central sections of the basin which lie just north of the Dry Lake Basin (UTMs 864544 to 866547; 1.23 ha.). Its species complement and community structure are typical of such swamps elsewhere in the region. There apparently is considerable flooding in the spring here, with the water being over 1 m deep; however, except for local spring swamps (L-4), there is no standing water by mid-summer. It has a normal microclimate with wet loams as its site type characteristics.

Its tree cover is strongly dominated by silver maple (**Acer saccharinum**) and green ash (**Fraxinus pennsylvanica** var. **subintegerrima**), accompanied by white elm (**Ulmus americana**), swamp white oak (**Quercus bicolor**) and others. The swamp white oak here occurs within this stand in quite notable local concentrations, itself forming a vegetation pattern which is quite uncommon within the region.

The shrub cover is very open to semiopen, and is presented only as scattered gray dogwood (**Cornus foemina** subsp. **racemosa**) and narrow-leaved meadowsweet (**Spiraea alba**), and less commonly includes the occasional buttonbush (**Cephalanthus occidentalis**), riverbank grape (**Vitis riparia**) and, very locally, southern arrowwood (**Viburnum recognitum**).

The herb cover is barren and very open to locally closed. Its species complement is characterized by the presence of reed canary grass (**Phalaris arundinacea**), rice cut grass (**Leersia oryzoides**), fowl meadow grass (**Glyceria striata**), sedges (**Carex retrorsa, C. tuckermanii, C. intumescens**), false nettle (**Boehmeria cylindrica**), clearweed (**Pilea pumila**), bristly crowfoot (**Ranunculus pensylvanicus**), northern bugleweed (**Lycopus uniflorus**), deadly nightshade (**Solanum dulcamara***), pasture bedstraw (**Galium trifidum**) and panicled Aster (**Aster lanceolata**). These commonly are accompanied by very scattered common enchanter's nightshade (**Circaea lutetiana**), tufted loosetrife (**Lysimachia thyrsiflora**), mad-dog skullcap (**Scutellaria lateriflora**), turtlehead (**Chelone glabra**) or leafy beggar's-ticks (**Bidens frondosa**).

53 species occur in this community (9 trees, 10 shrubs, 34 herbs).

1 nationally and provincially rare species occurs here: southern arrowwood (**Viburnum recognitum**). Additionally, only 1 regionally significant herb is recorded: sedge (**Carex projecta**). Of note is the large population of swamp white oak (**Quercus bicolor**) which at least locally constitutes a major component within the tree canopy (about UTM 864546). Riley (1988) has indicated that this Carolinian species is restricted within Central Region.

L-3 Wet: Successional Swamp Forest Green Ash

This is a small grove of young green ash which occupies a shallow depression that forms an arm on the northeastern side of the Dry Lake Basin (0.73 ha.). The wet loams here are flooded in the spring, and also possibly periodically over the growing season. This has a normal microclimatic situation.

The tree cover is closed, and is dominated by young green ash (**Fraxinus pennsylvanica** var. **subintegerrima**). There is no shrub cover except for the profuse saplings of this species.

The herb cover is semiopen, and includes fowl meadow grass (**Glyceria striata** var. **striata**), reed canary grass (**Phalaris arundinacea**), sedge (**Carex cristatella**), bristly crowfoot (**Ranunculus pensylvanicus**), leafy beggar's-ticks (**Bidens frondosa**), common ragweed (**Ambrosia artemisiifolia**) and calico Aster (**Aster lateriflora**).

Only 8 species are recorded from here (1 trees, 7 herbs).

No significant species are recorded from this community.

L-4 Wet: Spring Swamp Forest Inclusion Silver Maple - Green Ash

Several of the shallow, wet depressions within the upland forests in the immediate vicinity of the lowland depression and local sloughs of the ANSI support small deciduous swamp forest communities (0.67 ha.). These have an elongated shape, typically being about 20 m wide and 90 m long. They have standing water at least until early summer, and often until mid-summer. They occur on wet loams in a normal microclimate.

The tree cover is semiopen to semiclosed, and is dominated by silver maple (**Acer saccharinum**) and green ash (**Fraxinus pennsylvanica** var. **subintegerrima**), and frequently includes red maple (**Acer rubrum**), swamp white oak (**Quercus bicolor**), black ash (**Fraxinus nigra**)s and others.

The shrub cover is semiopen, and is dominated by blue beech (**Carpinus caroliniana**), winterberry (**Ilex verticillata**) and gray dogwood (**Cornus foemina** subsp. **foemina**).

The herb cover is very open to semiclosed, and is dominated by sensitive fern (**Onoclea sensibilis**), fowl meadow grass (**Glyceria striata** var. **striata**), sedge (**Carex intumescens**), false nettle (**Boehmeria cylindrica**), clearweed (**Pilea pumila**), northern willow-herb (**Epilobium ciliatum**), water-parsnip (**Sium suave**), deadly nightshade (**Solanum dulcamara***), northern bugleweed (**Lycopus uniflora**) and leafy beggar's-ticks (**Bidens frondosa**).

31 species occur here (10 trees, 5 shrubs, 16 herbs).

Regionally significant species occurring here include soft rush (**Juncus effusus** var. **solutus**), and possibly also lowland Virginia creeper (**Parthenocissus quinquefolia**) which was tentatively sighted by Macdonald (1988) in the ANSI's northeastern portion; this latter species is rare in Central Region (Riley 1988).

L-m Wet: Slough Fringe Marsh Meadow

This community occurs only as very small features (0.06 ha.) on the margins of the slough depressions (UTMs 863544 and 866564). It differs from the larger wetland marshes in its association with the lowland features and its different species complement. It occupies wet loams in normal microclimatic situations.

The tree cover is very scattered, often occurring only as sparse saplings. Black ash (**Fraxinus nigra**) is the only species recorded.

The shrub cover also is extremely open with narrow-leaved meadowsweet (**Spiraea alba**), winterberry (**Ilex verticillata**) and buttonbush (**Cephalanthus occidentalis**).

The herb cover is closed, with a complement that is characterized and often dominated by marsh fern (**Thelypteris palustris** var. **pubescens**), spotted touch-me-not (**Impatiens capensis**), sedges (**Carex lacustris, C. crinita**), three-way sedge (**Dulichium arundinaceum**), woolgrass (**Scirpus cyperinus**), dwarf raspberry (**Rubus pubescens**), northern marsh St. John's-wort (**Triadenum fraseri**) and nodding beggar's-ticks (**Bidens cernua**).

15 species are recorded from this community (1 tree, 3 shrubs, 11 herbs).

3 regionally significant species occur in this small community: American burreed (**Sparganium americanum**), three-way sedge (**Dulichium arundinaceum**) and soft rush (**Juncus effusus** var. **solutus**).

L-t Wet - Very Wet: Slough Fringe Thicket

This community often occurs in association with the above meadow (L-m) along the margins of the slough depressions (0.15 ha.). It typically forms a fringe between the buttonbush thicket (L-b) and the marginal grove (L-g). Its site type characteristics are wet to very wet moisture regimes on a loam substrate in a normal microclimate.

While no tree cover is recorded, the shrub cover is closed to semiclosed, and is dominated by narrow-leaved meadowsweet (**Spiraea alba**), pussy willow (**Salix discolor**), swamp rose (**Rosa palustris**), winterberry (**Ilex verticillata**), highbush cranberry (**Viburnum trilobum**) and buttonbush (**Cephalanthus occidentalis**).

The herb cover is semiclosed to semiopen, and includes marsh fern (**Thelypteris palustris** var. **pubescens**), fowl meadow grass (**Glyceria striata** var. **striata**), sedge (**Carex crinita**), dwarf raspberry (**Rubus pubescens**), northern bugleweed (**Lycopus uniflorus**), mad-dog skullcap (**Scutellaria lateriflora**) and nodding beggar's-ticks (**Bidens cernua**).

At least 13 species occur here (6 shrubs, 7 herbs).

No significant species are recorded from this community.

L-b Very Wet: Slough Thicket Buttonbush

This is the one community which best characterizes the slough depressions of the Haldimand Clay Plain (Macdonald 1980). It presents a distinctive thicket growth which is almost exclusively dominated by buttonbush. Within the study area it presents 2 stands at the western portion of the lowland depression, and 2 in the northeastern portion of the ANSI (UTMs 863544, 864546, 864563 and 865564; 5.23 ha.). Its very wet to saturated loam soils occur in a normal microclimatic situation. There generally is perennial standing water in most of these stands, but there may be some drawdown over the growing season.

The tree cover is extremely open, and includes very scattered saplings, or an occasional ancient tree, of silver maple (**Acer saccharinum**), green ash (**Fraxinus pennsylvanica** var. **subintegerrima**), crack willow (**Salix fragilis** var. **fragilis**), white elm (**Ulmus americana**) and swamp white oak (**Quercus bicolor**).

The shrub cover is very closed and presents a height of over 4 m. This is strongly dominated by buttonbush (**Cephalanthus occidentalis**), accompanied by scattered winterberry (**Ilex verticillata**), water willow (**Decodon verticillata**), swamp rose (**Rosa palustris**) and others.

The herb cover is semiopen to open, and is dominated and characterized by the scattered presence of fowl meadow grass (**Glyceria striata** var. **striata**), rice cut grass (**Leersia oryzoides**), sensitive fern (**Onoclea sensibilis**), lesser duckweed (**Lemna minor**), swamp dock (**Rumex verticillata**), water-purslane (**Ludwigia palustris**), yellow water buttercup (**Ranunculus flabellaris**), marsh speedwell (**Veronica scutellata**),

pasture bedstraw (**Galium trifidum**), leafy beggar's-ticks (**Bidens frondosa**) and nodding beggar's-ticks (**B. cernua**).

38 species occur in this community (5 trees, 8 shrubs, 24 herbs, 1 aquatic).

2 regionally significant species are recorded from this community: sedge (**Carex projecta**) and lowland Virginia creeper (**Parthenocissus quinquefolia**). As well, of interest within Central Region is the presence of the swamp white oak (**Quercus bicolor**) among the thicket growth.

W BASIN WETLAND COMMUNITIES

This group of communities is restricted to the Dry Lake Basin at the southern end of the ANSI, and covers 31.80 ha, or 10.39% of its total surface area. The basin encloses 2 sections (about UTMs 863541 and 866543) which, at least seasonally, hold a considerable volume of standing water. However, as the name of these ponds implies - Dry Lake - the feature has been characterized historically by seasonally decreasing water levels. Indeed, this water level fluctuation is reported to quite dramatic due to the nature of its source, which would have the basin change from a dry bowl to a full pond by means of an artesian-like gyser in the centre of the southwestern pond. This activity has been somewhat restrained since the establishment of a dam between the two ponds by Ducks Unlimited in the mid-1980s. 7 communities are recognized here; all are wetland communities which generally are quite common within the region. They are listed in Table 2, mapped in Map 1 and Figure 6, and are briefly described below.

W-g Wet Mesic - Wet: Wetland Basin Fringe Grove

This community forms discontinuous, narrow groves which fringe the pond basin's margins (3.98 ha.). The mesic to wet loams here occur in a normal microclimatic situation.

The tree cover is semiclosed, and is dominated by green ash (**Fraxinus pennsylvanica** var. **subintegerrima**) and silver maple (**Acer saccharinum**), with occasional white elm (**Ulmus americana**), eastern cottonwood (**Populus deltoides**) and others.

The shrub cover is semiopen to semiclosed, and includes narrow-leaved meadowsweet (**Spiraea alba**), gray dogwood (**Cornus foemina** subsp. **racemosa**), red-osier dogwood (**C. stolonifera**) and climbing poison ivy (**Toxicodendron radicans** var. **radicans**).

The herb cover is very open to semiclosed, and is dominated by rough cinquefoil (**Potentilla norvegica***), reed canary grass (**Phalaris arundinacea**), marsh skullcap (**Scutellaria lateriflora**), American burnweed (**Erechtites hieraciifolia**), annual fleabane (**Erigeron annuus** subsp. **annuus**) and others.

35 species occur in this community (10 trees, 9 shrubs, 16 shrubs).

No regionally significant species are recorded here. Of interest is the presence of cut-leaved avens (**Geum lanceolatum**), which formerly was recognized as being provincially rare, but now is delisted. As well, the eastern cottonwood (**Populus deltoides**) is restricted in Central Region (Riley 1988).

W-f Wet - Wet Mesic: Forb Marsh Meadow

Several of the smaller depressions fringing the basin support this broad-leaved wetland meadow community (0.52 ha.). It may be associated with the more prompt downdraining of the pond's water level in the arms and with the local disturbances from the several farm vehicle access channels. The wet mesic to wet loams occur in a normal microclimate.

The shrub cover is generally extremely open with very scattered red-osier dogwood (**Cornus stolonifera**) and crack willow (**Salix fragilis** var. **fragilis***).

The broad-leaved herb cover is closed to semiclosed, with the characteristic species being rice cut grass (**Leersia oryzoides**), marsh cress (**Rorippa palustris** subsp. **fernaldiana**), tall meadow-rue (**Thalictrum pubescens** var. **hebecarpon**), spotted touch-me-not (**Impatiens capensis**), swamp milkweed (**Asclepias incarnata**), marsh skullcap (**Scutellaria galericulata**), cocklebur (**Xanthium strumarium**), panicled Aster (**Aster lanceolatus**), purple-stemmed Aster (**A. puniceus**), American burnweed (**Erechtites hieraciifolia**), nodding beggar's-ticks (**Bidens cernua**), boneset (**Eupatorium perfoliatum**) and others.

22 species are recorded here (2 shrubs, 20 herbs).

No significant species are recorded from this community.

W-m Wet - Wet Mesic: Tall Graminoid Marsh Meadow

The more open, level portions of the basin support an extensive tall graminoid marsh community which appears to be dominated solely by reed canary grass (9.12 ha.). This is the most extensive cover pattern in the basin. It experiences flooding in the spring and autumn, but generally has no standing water by early summer. Its wet mesic to wet loams occur in a normal microclimate.

The tree and shrub cover here is only an extremely open cover of very scattered, low trees and shrubs, including green ash (**Fraxinus pennsylvanica** var. **subintegerrima**), silver maple (**Acer saccharinum**), crack willow (**Salix fragilis**), white elm (**Ulmus americana**) and red-osier dogwood (**Cornus stolonifera**).

The herb cover is semiclosed to closed, and generally is strongly dominated by a single species: reed canary grass (**Phalaris arundinacea**). Also occurring here are rice cut grass (**Leersia oryzoides**), marsh cress (**Rorippa palustris** subsp. **fernaldiana**), water-purslane (**Ludwigia palustris**), spotted smartweed (**Polygonum punctatum**), water-parsnip (**Sium suave**), eastern manna grass (**Glyceria septentrionalis**), boneset (**Eupatorium perfoliatum**) and others.

36 species are recorded here (4 trees, 1 shrub, 31 herbs).

1 regionally significant species is recorded from here: green-fruited burreed (**Sparganium chlorocarpum**).

W-w Wet: Pond Fringe Drawdown Meadow

The drawdown cycle of the pond water over the growing season exposes wet silty loams to the invasion of aggresive wetland species (6.94 ha.). This community occupies these normal sites which surround the ponds, typically as narrow bands.

However, in the eastern of the two ponds it presents an extensive closed carpet (UTM 866543), and in the western pond it occurs as a small depression sward within the taller grassy marsh (UTM 865540). The environmental situation of the seasonal drop in water level and the gradual exposure of the land create an unusual habitat for species to occupy. Indeed, this distinctive combination of conditions is probably critical for the existence of the large population of the nationally and provincially rare many-fruited false loosestrife which occurs here.

The shrub cover here occurs only as very scattered sandbar willows (**Salix exigua**).

The herb cover is semiclosed, presenting a low carpet which develops over the growing season with the drawdown of the pond water. Strikingly dominant here are golden nut-rush (**Cyperus esculentus**) and Pennsylvania smartweed (**Polygonum pensylvanicum** var. **laevigatum**), with a frequent presence of water smartweed (**Polygonum amphibium** var. **stipulaceum**), reed canary grass (**Phalaris arundinacea**) and many-fruited false loosestrife (**Ludwigia polycarpa**). Also accompanying these dominants are scattered creeping love grass (**Eragrostis hypnoides**), needle spikerush (**Eleocharis acicularis**), red-based spikerush (**E. erythropoda**), rivershore galingale (**Cyperus rivularis**), blood-stained bulrush (**Scirpus microcarpus** var. **rubrotinctus**), ditch stonecrop (**Penthorum sedoides**), nodding smartweed (**Polygonum lapathifolium**), water-parsnip (**Sium suave**), false pimpernel (**Lindernia dubia**), nodding beggar's-ticks (**Bidens cernua**) and others.

29 species are recorded from this community (1 shrub, 27 herbs, 1 aquatic).

1 nationally and provincially rare species occurs here: many-fruited false loosestrife (**Ludwigia polycarpa**). The life cycle of this species is directly related to the drawdown cycle of the pond water over the growing season (see below, II.B.3). As well, of interest are the local spreading carpets of the provincially delisted creeping love grass (**Eragrostis hypnoides**) which is rare in Central Region (Riley 1988).

W-t Wet - Very Wet: Wetland Basin Fringe Thicket

This community occurs as a narrow, discontinuous shrubby fringe around the basin's upper reaches (UTM 867544), and as a thicket cover in the central portions of the basin (UTM 863541; 0.21 ha.). It has wet to very wet loams in a normal microclimate.

The tree cover is very open with eastern cottonwood (**Populus deltoides**) and green ash (**Fraxinus pennsylvanica** var. **subintegerrima**).

The shrub cover is very closed to semiopen, and is variously dominated by red-osier dogwood (**Cornus stolonifera**), gray dogwood (**C. foemina** subsp. **racemosa**), slender willow (**Salix petiolaris**), stiff willow (**S. eriocephala**), sandbar willow (**S. exigua**), buttonbush (**Cephalanthus occidentalis**) and others.

The herb cover is open to semiclosed, and includes Canada bluejoint (**Calamagrostis canadensis**), rice cut grass (**Leersia oryzoides**), sedge (**Carex tenera**), marsh cress (**Rorippa palustris** subsp. **fernaldiana**), tall meadow-rue (**Thalictrum pubescens** var. **bebecarpon**), field mint (**Mentha arvensis**) and late goldenrod (**Solidago altissima**).

20 species occur here (2 trees, 7 shrubs, 11 herbs).

No significant species are recorded from this community, although Riley (1988) indicated that eastern cottonwood (**Populus deltoides**) in restricted in Central Region.

W-e Very Wet - Saturated: Pond Emergent Graminoid Marsh

Very locally along the fringes of the pond's more stable standing water levels are several very small tall graminoid emergent marshes. Inland examples of this community are widespread within the region, but generally they are equally small (Gartshore et al. 1987 a). Here, it occupies very wet to saturated loams in a normal microclimate.

The herb cover is semiclosed, and commonly is dominated by one of the following tall graminoid species: great burreed (**Sparganium eurycarpum**), narrow-leaved cattail (**Typha angustifolia**) or broad-leaved cattail (**T. latifolia**). Accompanying this cover in the undergrowth are broad-leaved arrowhead (**Sagittaria latifolia**), water willow (**Decodon verticillatus**), water smartweed (**Polygonum amphibium** var. **stipulaceum**), Pennsylvania smartweed (**P. pensylvanicum** var. **laevigatum**), water-parsnip (**Sium suave**) and others.

12 species are recorded from this coummunity (11 herbs, 1 aquatic).

No significant species are recorded here.

W-a Open Water: Pond Aquatics

The open water of the Dry Lake ponds supports this community (7.96 ha.). It is rather poorly developed in the ANSI, apparently with a limited species complement. Its site type characteristics are a normal microclimate with open water conditions and a loam substrate.

The aquatics occur here as very scattered to local concentrations. The only floating species recorded is water smartweed (**Polygonum amphibium** var. **stipulaceum**); however, several submergent species are recorded, including pondweeds (**Potentilla palustris, P. natans**), purple duckweed (**Spirodela polyrhiza**), lesser duckweed (**Lemna minor**), common bladderwort (**Utricularia vulgaris**) and a distinctive algal species (**Chara** species).

7 species are recorded from here (7 aquatics).

No significant species are recorded from this community.

B. FLORA

1. INTRODUCTION

The vascular plant flora of the Oriskany Sandstone and Woodlands Area of Natural and Scientific Interest has been of great interest to botanical researchers for over a decade. P.F. Maycock's initial discovery of the rich, dry forest communities on the sandstone, and an apparent prairie remnant in adjacent openings, both occurring within the northern half of the ANSI in 1976 / 77, led other researchers, notably P.W. Ball and A.A. Reznicek, to investigate the flora of the areas north of Town Line Road and elsewhere. Publication of the results of their brief field studies indicated a flora of well over 300 species which included over 40 tree species, as well as 22 species which at that time were considered to be nationally and provincially rare (Fahselt et al. 1979). Additional studies were conducted by J.F. Alex (Ecological Services for Planning 1977) and G. de Boer and R. Suffling (de Boer et al. 1982); these concentrated on the Environmental Protection Area along the north side of Town Line Road, in the woodlands south of this road and in the northeastern corner of the ANSI. This work brought the total to over 350. Additionally, the recent brief studies of J. Kaiser (1986) and of the Haldimand - Norfolk Natural Areas Inventory project (Gartshore et al. 1987 a, 1987 b) and others within the ANSI raised the flora to about 365. However, the present intensive study by the author brings the total flora to 627 taxa, including species, subspecies, varieties and hybrids. This massive increase is accounted for by the inclusion in the flora of the formerly unsurveyed successional fields, disturbed quarry areas and roadsides, and the Dry Lake wetlands and adjacent lowlands.

Families	Species	var./subsp.	hybrid	TOTAL	non-native
97	608	11	8	627	143

Records which were accepted into the flora include collections and credible sight records. Several of the researchers collected specimens within the ANSI, and have deposited them in several public herbaria, notably Erindale College (TRTE), the University of Waterloo (WAT) and the University of Western Ontario (UWO). Those which were confirmed as being correctly determined and located within the ANSI were accepted (indicated in Appendix A by underlined source code). Also accepted were those which were based on sight records or field determinations by the following researchers: P.F. Maycock, R. Suffling, J. Kaiser, J.F. Alex, D.A. Sutherland and I.D. Macdonald (indicated in Appendix A by non-underlined source code). In several instances where there is potential for confusion with other species, the judgement of the experienced researchers is accepted with some reservations. Such is the case for the collections of G. de Boer who, while not permitted to collect on the site, would have confirmed the following determinations with R. Suffling and L. Lamb: **Silene armeria*** (sweet-William catchfly), **Fragaria vesca** (woodland strawberry), **Prunus avium*** (sweet cherry) and **Polygala senega** (Seneca snakeroot), and also for those of P.F. Maycock and J.F. Alex, both of whom have extensive field experience: **Camelina microcarpa*** (false flax).

27 records indicated by the researchers were not accepted into the flora. These are briefly listed and discussed at the end of Appendix A. In several instances the original collections were redetermined by floristic authorities, and these redeterminations are accepted for this report, as is the case for those of P.W. Ball and A.A. Reznicek of Erindale College (TRTE), A. Dugal of the National Museum of Canada (CAN), D.A. Sutherland and D. Bradley of the Haldimand - Norfolk Natural

Areas Inventory (H-N NAI), J.K. Morton of the University of Waterloo (WAT) and others. This was the case for claims of the nationally and provincially rare species: **Carya glabra** (pignut hickory), **Helianthemum canadense** (Canada frostweed), **Thaspium barbinode** (hairy-jointed meadow parsnip), **Pycnanthemum tenuifolium** (narrow-leaved mountain mint) and **Ruellia caroliniensis** (Carolina Ruellia). In other cases the records were not accepted for taxonomically difficult taxa which conceivably could have been misidentified in the field, and which are unlikely to occur due to lack of suitable habitat or to being well out of their normal range, and for which there was no vouching specimen available for confirmation. This was the case for Maycock's record of the nationally and provincially rare **Dichanthelium villosissimum** var. **praecocius** (villous panic grass), **Carya laciniosa** (kingnut hickory), and Ecological Services for Planning's (1977) report of the nationally and provincially rare **Virgulus sericeus** (western silver-leaved Aster). Other records are rejected due to uncertainties in the record, or to confusion in the taxonomy or nomenclature of the record.

2. FLORISTIC AFFINITIES

Maycock and others indicate that the flora of this ANSI supports a host of often significant species of Carolinian and Southern affinities, as well as a select array of those of prairie and northern affinities which occur here due to the environmental influence of the shallow sandstone bedrock (Fahselt 1977, Fahselt et al. 1979, de Boer et al. 1982, Gartshore et al. 1987 a).

The majority of the species in the flora have a southern affinity, with their ranges generally extending throughout the eastern United States and into southern Ontario as far north as the Canadian Shield. Many of these are common to uncommon in the Haldimand - Norfolk Region, but several are regionally rare to very uncommon, and a few are nationally and provincially rare. They occupy a variety of habitats, including the dry and circummesic forests, successional upland thickets and meadows, lowland forests and thickets, and wetlands. Notable among these occurring within the ANSI are the following: **Juniperus virginiana** (eastern red cedar), **Carex gracilescens** (sedge), **C. hirtifolia** (sedge), **Arabis canadensis** (sicklepod), **Prunus americana** (American wild plum), **Rosa carolina** (Carolina rose), **Rubus pensilvanicus** (Pennsylvania raspberry), **Desmodium nudiflorum** (naked-flowered tick-trefoil), **Rhus glabra** (smooth sumac), **Staphylea trifolia** (bladdernut), **Acer nigrum** (black maple), **Lechea villosa** (hairy pinweed), **Ludwigia polycarpa** (many-fruited false loosestrife), **Sanicula canadensis** (Canada black snakeroot), **Taenidia integerrima** (yellow pimpernel), **Phlox divaricarpa** (blue Phlox), **Conopholis americana** (squawroot), **Cephalanthus occidentalis** (buttonbush), **Viburnum recognitum** (southern arrowwood) and **Solidago bicolor** (white goldenrod).

Many of the species are members of the Carolinian Flora whose range extends from a more restricted portion of the eastern United States and into Canada only in the southwestern portion of Ontario. They generally favour the warmer microclimatic conditions provided by the sandstone plain's dry oak forests and open savannas and meadows, but also occupy circummesic and moist forests. Several of these also are nationally and provincially rare or regionally significant. Notable among these Carolinian species which occur within the ANSI are the following: **Disporum lanuginosum** (yellow mandarin), **Dioscorea villosa** (wild yam), **Carya ovata** (shagbark hickory), **Juglans nigra** (black walnut), **Castanea dentata** (American sweet chestnut), **Quercus bicolor** (swamp white oak), **Q. muehlenbergii** (Chinquapin oak), **Q. velutina** (black oak), **Celtis occidentalis** (hackberry), **Sassafras albidum** (Sassafras), **Hamamelis virginiana** (witch-hazel), **Malus coronaria** (wild crab apple), **Viola palmata** var. **palmata** (early blue wood violet), **Cornus florida** (eastern flowering dogwood), **Vaccinium pallidum** (hillside blueberry) and **Frasera caroliniensis** (American columbo).

Prior to settlement, open prairie meadows and savannas were relatively widespread in southwestern Ontario; however, their extent is now generally reduced to small, often isolated remnants. The ANSI supports several prairie species in the oak openings, dry forest fringes and select open meadows, and researchers indicate that, in the 1970s, a more extensive concentration of these prairie species existed on the Nelson Aggregate property at the site of the recent quarry development (UTM 858561; Fahselt et al. 1979). Several of the prairie species found here are also nationally and provincially rare and regionally significant. Notable here are the following: **Andropogon gerardii** (big bluestem), **Dichanthelium linearifolium** (narrow-leaved panic grass), **Potentilla arguta** (prairie cinquefoil), **Desmodium rotundifolium** (prostrate tick-trefoil), D. **paniculatum** vars. **paniculatum** and **dilleni** (panicled and Dillen's tick-trefoil), **Lespedeza capitata** (round-headed bush-clover), **L. intermedia** (intermediate bush-clover), **Polygala polygama** (racemed milkwort), **P. verticillata** (whorled milkwort), **Lechea intermedia** (common pinweed), **Helianthemum bicknellii** (Bicknell's frostweed), **Asclepias tuberosa** (butterfly weed), **Physalis heterophylla** (clammy ground-cherry), **Monarda fistulosa** (wild bergamot), **Galium pilosum** (hairy bedstraw), **Lobelia spicata** var. **hirtella** (pale-spiked Lobelia), **Aster laevis** (smooth Aster), **A. oolentangiensis** (azure Aster), **Virgulus ericoides** (heath Aster) and others.

Also occurring within the ANSI are several northern species whose Ontario occurrences tend to be associated more with the Canadian Shield than with southern Ontario. Maycock indicates that the acidic sandstone substrates of the area provide suitable habitat conditions for them. These tend to occur in the arid sandstone barrens, dry meadows and dry forests, but several also occur in the wetland situations around Dry Lake and in the sloughs. Included with these species are the following which are regionally significant: **Lycopodium clavatum** (running clubmoss), **Sparganium chlorocarpum** (green-fruited burreed), **Deschampsia flexuosa** (common hair grass), **Saxifraga virginiensis** (early saxifrage), **Amelanchier sanguinea** (dwarf Juneberry) and others.

The flora of this ANSI includes 144 introduced species, making up about 23% of the area's total flora. Most of these are non-natives with their origins being in the Old World, and they occur here as 'weeds', as introductions which have persisted from former cultivation or as plantation species. A wide variety of habitats are occupied by these species, with the successional communities having them as major components. Most of these are quite common within the region, but several apparently are regionally rare or very uncommon, or even newly reported in the regional flora (Sutherland 1987, 1989). Notable among these are the following: **Bromus mollis*** (soft chess), **Carex spicata*** (sedge), **Prunus cerasus*** (sour cherry), **Euphorbia exigua*** (dwarf spurge), **Epilobium parviflorum*** (small-flowered willow-herb), **Carduus acanthoides*** (plumeless thistle) and **Centaurea nigra*** (black knapweed).

Several naturally occurring hybrid species are recorded from the ANSI. One hybrid shrub is regionally rare and is reported to be locally common and forming pure thickets on the Oriskany sandstone (Sutherland 1987): **Rhus** X **borealis** [= **Rhus glabra** X **R. typhina**] (smooth X staghorn sumac). The 3 tree hybrids occurring in the ANSI are not truly significant within the region, however their regional occurrence is not listed in the literature (Sutherland 1987). These include **Quercus alba** X **Q. macrocarpa** (white X bur oak), **Q. rubra** X **Q. velutina** (northern red X black oak) and **Acer saccharinum** X **A. rubrum** (silver X red maple).

3. SIGNIFICANT SPECIES

Those vascular plant species which are rare in Ontario have been documented by the National Museum of Natural Sciences in Ottawa (Argus & White 1977, 1982, 1983; Argus & Keddy 1984; Argus et al. 1987). They regard a rare species as being:

> "... one that because of its biological characteristics, or because it occurs at the edge of its range, or, for some other reason, exists in low numbers or in very restricted areas in the region under consideration."

They also indicate threatened or endangered species in their discussions (see GLOSSARY). All of the provincially rare species recorded from this ANSI are reported by them also to be nationally rare.

Species which are significant within the Regional Municipality of Haldimand - Norfolk have been thoroughly documented by the Haldimand - Norfolk Natural Areas Inventory (Gartshore et al. 1987 a, 1987 b; Sutherland 1987). Those which are regionally rare (1 to 5 stations in the region) and regionally very uncommon (6 to 8 stations) are considered to be 'regionally significant' for the purposes of this report. Additionally, Riley (1988) has identified species within Central Region (eastcentral Lake Erie to southeastern Georgian Bay to central Lake Ontario) which are considered as being 'rare', or which have a 'restricted' distribution.

a. NATIONALLY AND PROVINCIALLY RARE SPECIES

Fahselt et al. (1979) document the discovery in 1976 / 77 by Maycock, Ball, Reznicek and others of 22 vascular plant species within the ANSI which, at that time following the initial studies of Argus & White (1977), had been considered to be provincially rare. Subsequent revisions to this provincial treatment had delisted some of the species, but added others (Argus & White 1982, 1983; Argus & Keddy 1984; Argus et al. 1987). Fahselt et al. (1979) reported following 13 'delisted' species from the ANSI (and since then an additional 14 species which also were delisted have been recorded from the ANSI; see Table 3 and Chapter II B 2 h):

Asplenium platyneuron - ebony spleenwort
Polygonatum biflorum - smooth Solomon's-seal
Juglans nigra - black walnut
Quercus bicolor - swamp white oak
Quercus muehlenbergia - chinquapin oak
Ranunculus hispidus var. **hispidus** - bristly buttercup
(= **R. h.** var. **marilandicus**)
Arabis canadensis - sicklepod
Prunus americana - American wild plum
Lespedeza intermedia - wand-like bush clover
Vaccinium pallidum - hillside blueberry
Asclepias exaltata - poke milkweed
Conopholis americana - squawroot
Aster pilosus var. **pilosus** - downy white Aster

Nevertheless, it is noteworthy that, in spite of their loss of provincial status, at least 4 of these species still are reported as being regionally significant (Sutherland 1987), and 7 are regarded as being rare or restricted in Central Region (Riley 1988).

Table 3: Significant Vascular Plant Flora of the Oriskany Sandstone and Woodlands Area of Natural and Scientific Interest (6 pages)

SIGNIFICANCE
(Argus & White 1982, 1983; Argus & Keddy 1984; Argus et al. 1987; Sutherland 1987)

NrPr	rare in Canada and Ontario
Rr	rare in Haldimand - Norfolk Region or Haldimand Portion (1 - 5 stations)
Rvuc	very uncommon in Haldimand - Norfolk Region (6 - 8 stations)
Rn	regionally new (previously unreported from Haldimand-Norfolk)
Px	delisted from rare status in Ontario
*	adventive or otherwise introduced

SOURCES
(underline indicates collection by source)

A	J.F. Alex 1977 (OAC)
B	P.W. Ball 1977 (TRTE PWB)
Br	D. Bradley 1985 (TRTE)
D	G. de Boer et al. 1982 (WAT)
E	Ecological Services for Planning 1977 (OAC)
L	L. Lamb 1980 (LEL WAT)
M1	L.D. Macdonald 1976 (TRTE)
M2	L.D. Macdonald 1988 (TRTE WAT UWO)
My	P.F. Maycock 1976, 1977 (PFM TRTE)
O2	M.J. Oldham 1988 (TRTE MICH CAN)
P	J.B. Phipps 1980 (UWO)
R	A.A. Reznicek 1977 (TRTE MICH)
S	D.A. Sutherland 1985, 1986 (TRTE CAN)

VEGETATION COMMUNITIES
(codes follow those of vegetation discussion)

S	Sandstone Pavement
Q	Quarry Communities
A	Anthropogenic Communities
X	Successional Communities
P	Plantation
PP	Prairie
F	Upland Forest Communities
L	Lowland Communities
W	Basin Wetland Comunities

TOTALS

NrPr			Rr		new		Rvuc		PxRc/uc
Rr	Ruc	Rc	nat	* **	nat	* **	nat	* **	
5	3	4	17	10	4	6	20	2	22

— NATIONALLY and PROVINCIALLY RARE TAXA —

also REGIONALLY RARE

Crataegus dodgei Ashe hawthorn	S	S-t
Desmodium rotundifolium (Michaux) DC. prostrate tick-trefoil	D L M2 My	PP F-0 1
Linum virginianum L. Virginia yellow flax	B My	PP
Ludwigia polycarpa Short & Peter many-fruited false loosestrife	My O2 M2 S	W-w
Frasera caroliniensis Walter American columbo	My R	F-9

also REGIONALLY UNCOMMON

Carex gracilescens Steudel sedge	B R My	F-9 11
Viola palmata L. var. **palmata** early blue wood violet	R P D	X-t? PP F-4? 11
Galium pilosum Aiton hairy bedstraw	D M2 My	S-t PP F-0 1 4

also REGIONALLY COMMON

Disporum lanuginosum (Michaux) Nicholson yellow mandarin	D M2 My M1	F-1? 4 5 9 11 12
Castanea dentata (Marshall) Borkh. American sweet chestnut	A	F-1?
Lechea villosa Ell. hairy pinweed	S	S-m
Viburnum recognitum Fernald southern arrowwood	M2 M1	L-12

— REGIONALLY RARE NATIVE TAXA —

Polypodium virginianum L. common polypody	Br D M2	F-2 12
Sparganium americanum Nuttall American burreed	M2	L-m
Bromus kalmii A. Gray Kalm's brome grasss	D	Q-o?
Deschampsia flexuosa (L.) Trinius common hair grasss	D M2 My	Soe F-0 4 5
Lilium philadelphicum L. wood lily	D	—

Populus deltoides Marshall X **P. tremuloides** Michaux hybrid poplar	S	Q-f?
Crataegus holmesiana Ashe hawthorn	M2	F-11
Potentilla arguta Pursh prairie cinquefoil	M2 My	S-m PP
Rubus pensilvanicus Poiret Pennsylvania raspberry	S M2	Q-xf A-c X-stlc L-1 F-0 1 6 11
Desmodium cuspidatum (Willd.) Loudon long-bracted tick-trefoil	D L M2	F-0
Desmodium paniculatum (L.) DC. var. **paniculatum** panicled tick-trefoil	M2 B My	S-0 X-pl PP F-0 1 2
Geranium bicknellii Britton Bicknell's cranesbill	B D Br M2 E	S-oemt Q-ox X-t
Rhus X **borealis** (Britton) Greene hybrid sumac	My M2	S-t
Rhus glabra L. smooth sumac	B D S M2	S-oet Q-g A-r X-mt PP
Asclepias tuberosa L. butterfly weed	M2 D c/r	S-e
Hackelia virginiana (L.) Johnston beggar's-lice	M2 c/r	A-r X-c F-16
Triodanis perfoliata (L.) Nieuwland Venus' looking glass	A E S Px	S-o? Q-x?

— REGIONALLY RARE NON-NATIVE TAXA —

Bromus mollis L. • soft chess	B	F-2?
Convallaria majalis L. • lily-of-the-valley	My E	--
Ornithogalum umbellatum L. • star-of-Bethlehem	D	--
Salix caprea L. • goat willow	M2	X-h
Dianthus barbatus L. • sweet William	D	A-r
Sedum telephium L. • live-forever	M2	X-s
Aegopodium podograria L. • goutweed	M2	X-h
Carduus acanthoides L. • plumeless thistle	D M2	S-t

Centaurea nigra L. • black knapweed	M2	X-s	
Tragopogon pratensis L. • meadow goat's-beard	E M2	S-o	

— REGIONALLY NEW NATIVE TAXA —
(unreported from Haldimand-Norfolk in Sutherland 1987)

Crataegus chrysocarpa Ashe hawthorn	My	PP	
Hackelia deflexa (Wahlberg) Opiz var. **americana** A. Gray stickseed	My	F-l	
Antennaria neodioica Greene subsp. **canadensis** (Greene) Bayer & Stebbins smooth small pussytoes	D M2	F-0	
Solidago canadensis L. X **S. juncea** Aiton hybrid goldenrod	M2	F-0	

— REGIONALLY NEW NON-NATIVE TAXA —

Salix fragilis L. X **S. babylonica** L. • weeping willow	M2	X-m	
Silene armeria L. • sweet-William catchfly	D	--	
Camelina microcarpa Andrz. ex DC. • false flax	My E	--	
Prunus cerasus L. • sour cherry	M2 My R	S-e	Q-xt
Euphorbia exigua L. • dwarf spurge	M2	A-r	
Artemisia biennis Willd. • biennial wormwood	My E M2	Q-ox?	

— REGIONALLY VERY UNCOMMON NATIVE TAXA —

Dryopteris cristata (L.) A. Gray crested woodfern	M2	F-6	
Sparganium chlorocarpum Rydberg green-fruited burreed	M2	W-m	
Carex brevior (Dewey) Mack. sedge	My	--	
Carex projecta Mack. sedge	M2	L12b	
Dulichium arundinaceum (L.) Britton three-way sedge	M2	Lm	

Juncus effusus L. var. **solutus** (Fernald & Wiegland) Hamit-Ahti soft rush	M2	L-4m
Quercus muehlenbergii Engelmann Chinquapin oak	B D M2 My E	Q-gf X-mpsgn F-0 1 2 3 6 7 9 10
Ulmus thomasi Sargent rock elm	My E	—
Ranunculus hispidus Michaux var. **hispidus** bristly buttercup	B R My	F-1
Arabis canadensis L. sicklepod	D My K M2	Q-f F-1? 4 11
Saxifraga virginiensis Michaux early saxifrage	G E D M12	S-oe
Amelanchier sanguinea (Pursh) DC. (complex) dwarf juneberry	M2	S-o X-s F-11
Polygala senega L. Seneca snakeroot	D	—
Parthenocissus quinquefolia (L.) Planchon lowland Virginia creeper	My D M2	L-4b
Samolus parviflorus Raf. water pimpernel	M2	L-1
Apocynum sibiricum Jacquin var. **cordigerum** (Greene) Fernald clasping-leaved dogbane	M2	X-p
Agalinis paupercula (A. Gray) Britton small-flowered Agalinis	B	PP
Penstemon hirsutus (L.) Willd. hairy beard-tongue	D My	PP F-0
Conopholis americana (L.) Wallroth squawroot	My D E	F-1?
Gnaphalium viscosum Humbolt, Bonpland & Kunth sticky sweet everlasting	B S	PP S-m
— REGIONALLY VERY UNCOMMON NON-NATIVE TAXA —		
Epilobium parviflorum Schreber • small-flowered willow-herb	S	--
Lonicera morrowi A. Gray • Morrow's honeysuckle	M2	X-tg F-1
— PROVINCIALLY DELISTED NATIVE TAXA — (mostly regionally common or uncommon)		
Asplenium platyneuron (L.) Oakes ex D.C. Eaton ebony spleenwort	My D M2 S	Q-xf F-0 1? 4

Bromus pubescens Muhl. ex Willd. Canada brome grass	M2	F-11
Eragrostis hypnoides (Lamarck) BSP. creeping love grass	M2	W-w
Carex woodii Dewey sedge	M2	F-1
Polygonatum biflorum (Walter) Elliott Solomon's-seal	D My	F-1?
Dioscorea villosa L. wild yam	D M2 My	L-1
Juglans nigra L. black walnut	D My M2	S-et Q-tg X-mpstgn F-1 2 3 6 11 12
Quercus bicolor Willd. swamp white oak	B D M2 My M	L-1g23b
Geum laciniatum Murray cut-leaved avens	M2	F-12 W-g
Prunus americana Marshall American wild plum	R M2 My E D	X-t F-1 6 11 12
Desmodium nudiflorum (L.) DC. naked-flowered tick-trefoil	D	--
Lespedeza intermedia (S. Watson) Britton wand-like bush-clover	B D G M2 My	S-o X-p PP F-0 1 2 4 5 6
Helianthemum bicknellii Fernald Bicknell's frostweed	B D My	PP S-m
Viola sagittata Aiton arrow-leaved violet	R	S-m?
Sanicula canadensis L. var. **canadensis** Canada black snakeroot	M2	F-1 13 L-1
Cornus florida L. eastern flowering dogwood	D G My K M2	F-5 6 12
Vaccinium pallidum Aiton hillside blueberry	R M2 My	F-0 1?
Asclepias exaltata L. poke milkweed	My	F-0? 1? 2?
Pycnanthemum virginianum (L.) Durieu & Jackson Virginia mountain mint	D M2	S-e F-0
Antennaria neodioica Greene subsp. **neodioica** downy small pussytoes	My E M12	F-0
Antennaria parlinii Fernald plantain-leaved pussytoes	My D M2	S-o F-0 1
Aster pilosus Willd. var. **pilosus** downy white Aster	B D M2 My	S-m Q-oxgmdf A-rp X-mpsitgfhc P-xpd F-0 1 2 6 7 11 12

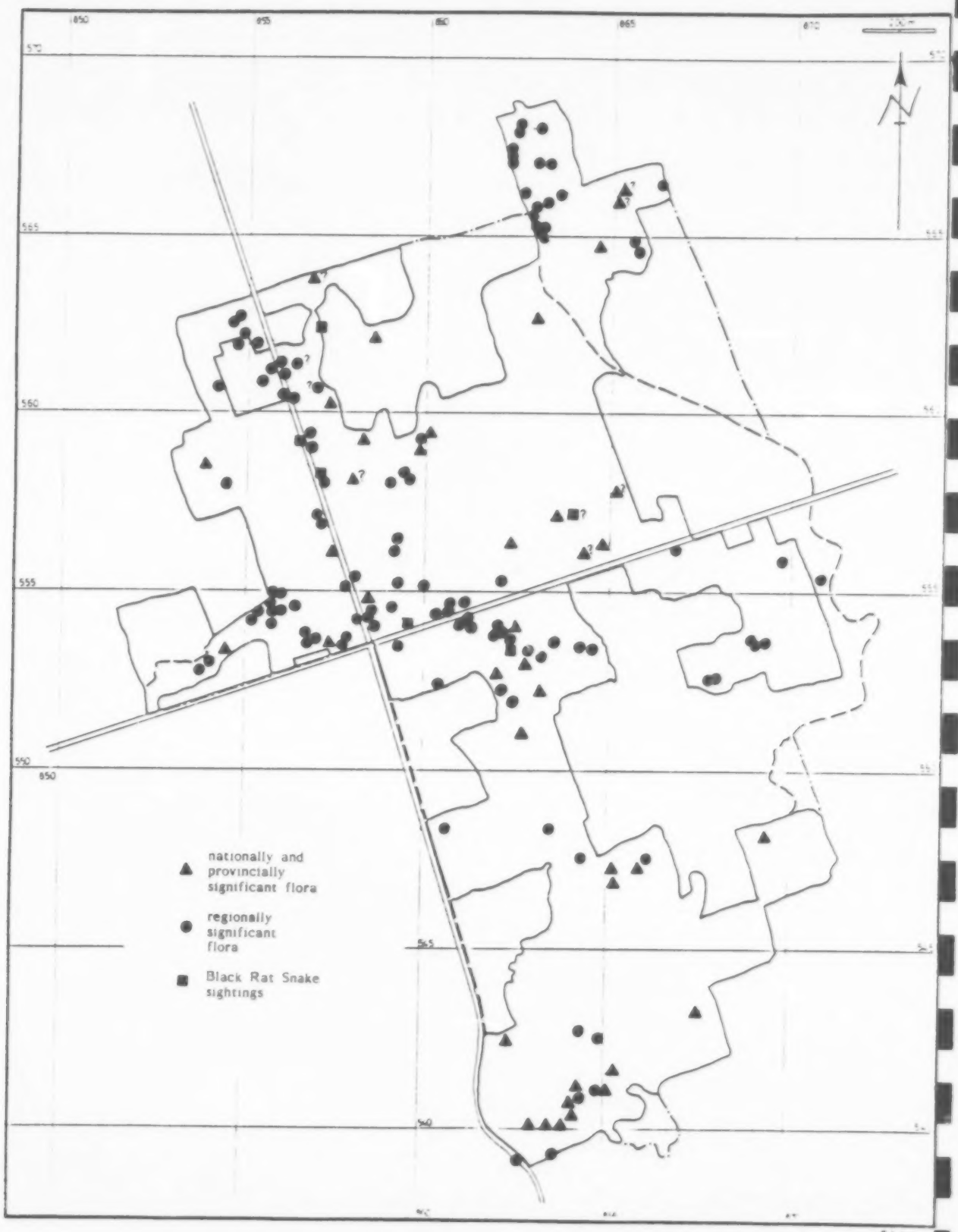

Figure 8: General Significant Flora and Fauna of the Oriskany Sandstone and Woodlands Area of Natural and Scientific Interest

As well, 3 of the claimed rarities from the ANSI were redetermined to be other species, one being of less significance than originally indicated, one also currently having national and provincial rarity status, and one of the claims being not accepted from the ANSI, as follows:

Dichanthelium villosissimum var. **praecocius** - wooly panic grass
(= **Panicum lanuginosum** var. **praecocius**, determination not accepted, no specimen available)
Viola pedata var. **linearíloba** - bird-foot violet
(redetermined to be the nationally and provincially rare V. **palmata** var. **palmata**)
Thaspium barbinode - meadow parsnip
(redetermined to be **Zizia aurea**)

Subsequent studies by these and other researchers, notably Alex (1977), de Boer et al. (1982), Lamb (1979), Macdonald (1976, 1988), Oldham (1988), Phipps (1980) and Sutherland (1987), have discovered 7 additional nationally and provincially rare species within the ANSI's boundaries. The total 12 nationally and provincially rare species are listed in Table 3 and their occurrences are briefly discussed below, and vouching record or collection data and housing herbaria[1] are indicated. Additionally, their distributions with Ontario and North America are presented in Appendix B.

Carex gracilescens Steudel - sedge

This is a graminaceous herb of moist woodlands which is a southeastern species that is restricted in Ontario to the Carolinian Zone. The ANSI was the first known regional station for this nationally and provincially rare and regionally uncommon species, although several stations have since been discovered. Riley (1988) indicates that this species is rare in Central Region. P.W. Ball (#15377: PWB) collected it from an unidentified wet mesic forest community along a trail about UTM 865565?, and Reznicek et al. (s.n.: TRTE 08746) collected it from a "dry open oak forest on thin soil over rock" (no location), and noted a third station "along path in sugar maple woods below the Onondaga escarpment" (community F-9?) in the northeastern corner of the ANSI (Reznicek 1989). Fahselt et al. (1979) indicated its occurrence in Maycock's Site V within the ANSI, probably citing Reznicek's record. It was not recorded during the 1988 survey, but may have been overlooked.

Disporum lanuginosum (Michaux) Nicholson - yellow mandarin

This nationally and provincially rare but regionally common species is an Appalachian mesic forest herb which is thinly widespread within the limits of the eastern half of the Carolinian Zone in Ontario. Riley (1988) indicates that his species is rare and restricted in Central Region. It has been collected and recorded from the ANSI by several researchers. Maycock noted its presence in the dry mesic oak - hickory forest (Community F-1?) of his Site II about UTM 867557. de Boer et al. (1982) collected it (s.n.: WAT) from the dry woodlands south of Town Line Road, probably about UTM 862552, and Sutherland (1989) also reports it from

1. Herbaria referred to this section are the following: **LEL**: L.E. Lamb; **PFM**: P.F. Maycock; **PWB**: P.W. Ball; **TRT**: Royal Ontario Museum; **TRTE**: Erindale College; **UWO**: University of Western Ontario; **WAT**: University of Waterloo.

here, at UTM 861552. Macdonald recorded and collected it (#19896: TRTE) from the mesic maple - oak forest east and north of Dry Lake at UTMs 869548, 867543 and 862551, and in the northeastern portion of the ANSI at UTM 864564. While it is not abundant in the forests, it commonly does occur as three or four plants in close proximity to each other, and usually is successfully fruiting.

Castanea dentata (Marshall) Borkh. - American sweet chestnut

This is a nationally and provincially rare and regionally common Carolinian tree species of mesic upland forests which was severely affected by the chestnut blight of the 1930s. Riley (1988) consideres this species to be rare and restricted in Central Region. Present day reports invariably document suckers which have sprung from the base of dead tree stumps, and rarely attain tree proportions before the blight reestablishes itself. Alex (1977) "reported the occurrence of sucker growth from an ancient American sweet chestnut ... at approximate location UTM 865558 (Beechey 1977). It is probable that this is a record from the northeastward trending transect in the Environmental Protection Area which was surveyed in late autumn 1977. A collection does not appear to have been made by Alex in the course of his survey.

Crataegus dodgei Ashe - hawthorn

This is a thinly widespread upland shrub of the Carolinian Zone in Ontario. Sutherland (1987) reports that he and Gartshore (#8017: TRTE) collected this nationally, provincially and regionally rare species from the Oriskany sandstone formation on "sandstone pavement in a small opening". His UTM grid reference of 857555 (Gartshore et al. 1986) originally indicated a station which would have occurred outside the present ANSI boundaries. However, in recent correspondence (Sutherland 1989) he indicates that the correct location of this station is to the south of Town Line Road (UTM 862553) where it occurs in a thicket at the edge of one of the sandstone pavement remnants. Perhaps it also occurs at a second station within the ANSI.

Desmodium rotundifolium (Michaux) DC. - prostrate tick-trefoil

This is a widespread, but local and quite rare, upland perennial herb of the Carolinian Zone in Ontario, and is considered to be rare in Central Region (Riley). It was indicated in Fahselt et al. (1979) as occurring within the large prairie opening at UTM 868561 prior to the development of the quarry in the 1980s. Maycock's transcription notes also indicate it from his Site II which is a dry mesic oak - hickory forest habitat (UTM 857558?). This nationally, provincially and regionally rare species was collected within the ANSI by de Boer (s.n.: WAT) in the Environmental Protection Area on "Oriskany sandstone outcrop", by Lamb in 1978 (no habitat or location information), and by Macdonald (#19888: TRTE) from a dry oak opening about UTM 860559 where it occurred as two sprawling plants in close proximity to each other.

Linum virginianum - Virginia yellow flax

This is a local southeastern upland perennial herb of dry sandy prairie oak forest openings in the Carolinian Zone in Ontario. It was collected within the ANSI by Ball (#49277: PWB) and was seen by Maycock in the large prairie opening about UTM 868561 in 1977, prior to its destruction by the quarry development. There are no subsequent reports of this nationally, provincially and regionally rare species from the ANSI or its vicinity. Riley (1988) reports that this is a rare species in Central Region.

Lechea villosa Ell. - hairy pinweed

This is a prostrate herb of dry prairies which is a southern species which occurs only in the Carolinian Zone of southern Ontario. It is nationally and provincially rare, but is common in Haldimand - Norfolk, possibly with the Norfolk Sand Plain having more populations than elsewhere in the province (Sutherland 1987). It has recently been reported by Sutherland (1989) from the ANSI in an open, very dry meadow on the sandstone outcrop (community S-m) to the south of Dry Lake Road (UTM 862552), in association with several regionally significant and interesting species, such as Bicknell's frostweed (**Helianthemum bicknellii**), sticky sweet everlasting (**Gnaphalium viscosum**) and whorled milkweed (**Polygala verticillata**). Riley (1988) does not list the species from Central Region, but has indicated that it has both rare and restricted status (Riley 1989).

Viola palmata L. var. **palmata** - early blue violet

This is a nationally and provincially rare and regionally uncommon upland forest herb which is widespread in the Carolinian Zone of Ontario, but is reported only from the Norfolk portion of the region (Sutherland 1987). Riley (1988) indicates that it is rare and restricted in Central Region. It has been collected at least 3 times within the ANSI. It was first collected by Reznicek (s.n.: TRTE 08937) from "dry open oak forest on this soil over rock" about UTM 856563 (?), and he also notes it from "open forest edges and fields". de Boer (1988) also reports that J.B. Phipps collected it (s.n.?: UWO) from more a mesic maple - oak forest site about UTM 857555 (?). And de Boer et al. (1982) also indicate a collection (s.n.: WAT) from the vicinity of the forests south of Town Line Road, but do not indicate a habitat. In several cases this species was originally misidentified as **Viola pedata** (birdfoot violet, also nationally, provincially and regionally rare), but this species was not encountered in the area or reported in its vicinity.

Ludwigia polycarpa Short & Peter - many-fruited false loosestrife

This is a rare southern shoreline and lowland species which is restricted to the Carolinian Zone in Ontario. Riley (1988) indicates that this species is rare and restricted in Central Region. The only station for this nationally, provincially and regionally rare species in the Haldimand - Norfolk Region is the shoreline of Dry Lake, from which it has has several collections by Maycock (#1287: PFM), Oldham (#8351), Macdonald (#19762: TRTE) and others. The present study recorded 12 separate groups of plants in the Dry Lake basin (about UTMs 862542, 863540, 864540, 864541 and 866542; Map 2), with a total population exceeding 100 plants. Its habitat is noticeably restricted to the drawdown barrens of the pond. As the

water level drops over the summer, the exposed wet mesic to wet silty shore barrens become invaded by a community of **Cyperus esculentus** (golden nut-grass), **Polygonum pensylvanicum** var. **laevigatum** (Pennsylvanian smartweed) and this species. By August the plants grow branches up to 0.4 m long which radiate from the stem as a 0.1 m to 0.3 m high rosette, and each branch produces many fruiting capsules. They are inundated as the water level rises in the late season and early spring. The critical habitat requirements of this species are closely attuned to the seasonal fluctuation of the water level in the pond. The inundation lessens competition from the tall graminoid cover, and the seed production capacity is probably amply adequate to renew the population in subsequent years. The long-term viability of this population may be threatened by the water regulation management activities of the Ducks Unlimited dam in the Dry Lake Basin.

Frasera caroliniensis Walter - American columbo

This is a very local perennial herb of wooded uplands which is restricted to the Carolinian Zone in Ontario. The ANSI is the only known station for this species in the region (Sutherland 1987). Maycock (1988) and Reznicek (1989) report having seen, but not collected, several individuals in the forest at the northeastern corner of the ANSI, about UTM 865565. This is a circummesic forest of northern red maple - red oak - white oak - sugar maple - American beech - eastern white pine - shagbark hickory - bitternut hickory (Community F-9, Map 1). Sutherland (1989) indicates a second station in the dry mesic forest (F-6) inthe northwestern portion of the ANSI (UTM 853558). As well, de Boer et al. (1982) indicate a station in the forest within their "Area C", about 500 m west of the study area (UTM 845555?); however, this citation may be an error of mapping in their summary report. This plant has an over 1 m deep taproot and produces a distinctive, 2 m tall stem. It was not observed by the author in 1988. It is listed as a candidate rare species in Canada by COSEWIC (Haber 1985), and is nationally, provincially and regionally rare, and is rare and restricted in Central Region (Riley 1988).

Galium pilosum Aiton - hairy bedstraw

This is a dry woodland and prairie perennial herb which is widespread within the Carolinian Zone of Ontario. It is nationally and provincially rare and regionally uncommon. As well, Riley (1988) indicates that it is rare and restricted in Central Region. It has been reported from the ANSI by several researchers. de Boer et al. (1982) collected it (s.n.: WAT) from the vicinity of the ANSI, but did not indicate its habitat or location. Maycock (1977.a) recorded it from the open prairie at UTM 859561 and from his Site I forest, a dry oak - hickory community (Fahselt et al. 1979). Macdonald (1988) collected it on several occasions (#19857, 19873, 19881: TRTE, WAT), from oak openings and dry to dry mesic oak - hickory - maple forests (Communities F-0, F-4 and F-11), and from dry successional old field low thickets, ans Sutherland (1989) indicates it in association with the nationally and provincially rare hawthorn: **Crataegus dodgei**. At least 7 present stations are known within the ANSI: UTMs 857553, 857560, 858554, 860559, 861553, 862552, 864556.

Viburnum recognitum - southern arrowwood

This is a southeastern species which occurs in several provinces in eastern Canada, and in southwestern and eastern Ontario. It is a deciduous shrub of lowland

sites, and is nationally and provincially rare and regionally common. Riley (1988) also regards this species as being rare and restricted in Central Region. It was recorded and collected by Macdonald (#19780: TRTE) from the silver maple - green ash swamp forest and adjacent lowland forests to the north of the Dry Lake basin (about UTM 865546) where it forms several small populations of less than a half dozen 1 m high plants, none of which were observed to be developing fruits. The populations here may be in the process of being shaded out by the surrounding forest canopy.

b. REGIONALLY RARE NATIVE TAXA

The Haldimand - Norfolk Natural Areas Inventory (Gartshore et al. 1987 a, 1987.b; Sutherland 1987) has been able to designate levels of significance for the flora of the region, with Regionally Rare species having 1 to 5 stations and Regionally Very Uncommon species having 6 to 8 stations. The flora of the ANSI includes 17 Regionally Rare native species and hybrids. As well, 6 of these species are recorded by Riley (1988) as being rare in Central Region. These are summarized in Table 3, and a brief discussion follows.

Polypodium virginianum L. - common polypody

This rockland and dry woodland perennial fern was collected by Bradley (#1001: TRTE) somewhere within the ANSI. de Boer et al. (1982) noted it in the Environmental Protection Area and in the dry forests south of Town Line Road. Macdonald noted it from the low escarpment mesic forest (F-12) at UTM 854552 and in the dry open oak - hickory rockland forests (F-2) about UTM 856560.

Sparganium americanum Nuttall - American burreed

This wetland perennial graminaceous herb was recorded by Macdonald in a slough margin meadow (L-m) at UTM 866563. While there was no collection, notes made during the survey differentiated this from similar species.

Bromus kalmii A. Gray - Kalm's brome grass

This upland grass was collected by de Boer (s.n.: WAT) from dry, exposed sandstone as part of her research in the vicinity of the recently developed quarry. Sutherland (1987) confirmed the identification. It was not noted during the present survey.

Deschampsia flexuosa (L.) Trinius - common hair grass

This is a grass of dry upland and rockland sites, and is more readily associated with the acidic rocklands of northern Ontario. Maycock recorded it from the sandstone outcrops of the ANSI, and de Boer (s.n.: WAT) and Macdonald (#19851: TRTE) collected it from the pavements (S-eo) and dry oak - hickory forest communities (F-0 4 5) about UTMs 862553 and 858554.

Lilium philadelphicum L. - wood lily

This dry upland meadow and forest perennial herb is often associated with prairie-like communities. de Boer et al. (1982) report a herbarium specimen (s.n.: WAT) from the rocklands of the ANSI area, but does not provide location information.

Populus deltoides Marshall X P. **tremuloides** Michaux - hybrid poplar

This hybrid was collected within the ANSI by Sutherland (#8018: TRTE?) and Gartshore from "shallow soil over sandstone pavement along a woodland edge" about UTM 857555. It occurrence is restricted within Central Region (Riley 1988).

Crataegus holmesiana Ashe - hawthorn

This dry upland tall shrub was collected by Macdonald (#19744: TRTE, determined by J.B. Phipps) from the maple - oak forest on the eastern side of Dry Lake at UTM 865541.

Potentilla arguta Pursh - prairie cinquefoil

This perennial herb is associated with the former prairie meadow community (Maycock 1977.a), and was collected by Macdonald (#19892: TRTE) from the dry sandstone meadow on the northern side of Town Line Road (UTM 860554). Sutherland (1987) reports that the collection reported in de Boer et al. (1982; de Boer (s.n.: WAT)) was misidentified. Riley (1988) regards this species as being rare in Central Region.

Rubus pensilvanicus Poiret - Pennsylvania raspberry

This is a southern shrub of upland sites which appears to be relatively frequent within the ANSI. It was collected by Sutherland (#8012: TRTE) "southeast of the intersection of Dry Lake and Town Line Roads", on a "small area of exposed sandstone." Macdonald collected it (#19773, 19778: TRTE, WAT) in a mesic maple - oak forest (F-11) and along the edge of a corn field (A-c), and recorded it at a wide variety of other sites at UTMs 854561, 858553, 863539, 863552, 862561, 864543, 865541, 865556, 866547 and 869553. Riley (1988) indicates this species to be rare in Central Region. It is possibly overlooked within the region, perhaps being confused with **R. canadensis**, and actually may be regionally uncommon.

Desmodium cuspidatum (Willd.) Loudon - long-bracted tick-trefoil

This is a provincially delisted herb species of dry upland meadows and forests; nevertheless, it still is rare in Central Region (Riley 1988). It was collected by de Boer (s.n.: WAT) in the dry outcrop forests southeast of the Dry Lake / Town Line Road intersection, and by Lamb (s.n.: LEL) who "reported it to be locally abundant in a dry rocky field in Lot 49 Conc. 1, Oneida Twp." (Sutherland 1987). Macdonald recorded it in an oak opening (F-0) at UTM 860558 where it had a population of at least 4 plants, none of which were flowering.

Desmodium paniculatum (L.) DC. var. **paniculatum** - panicled tick-trefoil

This dry upland perennial herb of prairie and open forest sites was recorded by Ball and Maycock (1977 a) from the large prairie meadow prior to its disturbance in the early 1980s. It was collected many times by Macdonald (#19823, 19870, 19874, 19879, 19883: TRTE, WAT, TRT) in a variety of sandstone barrens (S-o), successional meadows and thickets (X-pl), and dry upland forests and oak openings (F-0 4 5) at UTMs 862553, 857555, 859556, 859558, 859559, 855560 and 864556. It is similar to the more widespread Dillen's tick-trefoil (**D. p.** var. **dilleni**), but has narrower leaves. Riley (1988) classifies this species as being rare in Central Region.

Geranium bicknellii Britton - Bicknell's cranesbill

This annual herb is characteristic of the arid sandstone barrens within the ANSI. It has been collected by Ball (#18177: TRTE), de Boer (s.n.: WAT), Bradley (#1039: TRTE) and Macdonald (#19831: UWO), and was recorded by Ecological Services for Planning (1977) at UTMs 862553, 863553, 863554, 867552, 865556, 861554, 858554, 855554 and many others. Sutherland (1987) notes that it is common on the rocks of the Canadian Shield, but that "in southwestern Ontario it is probably local and quite rare on acidic sands or ... sites that have been recently burned", and Sutherland (1989) reports is as ground cover under the nationally and provincially rare hawthorn: **Cratagus dodgei.**

Rhus X **borealis** (Britton) Greene - hybrid sumac

This is a hybrid of the common staghorn sumac and the regionally rare smooth sumac (see below). It was recorded from the ANSI by Maycock (1977 a) and Macdonald (1988). Sutherland (1987) indicates it to be locally common within the ANSI; however, Macdonald (1988) noted it only once in the sandstone thicket community (S-t) at UTM 861555.

Rhus glabra L. - smooth sumac

This is a dry upland shrub which is widespread in Ontario, but is rare in Central Region (Riley 1988). It was collected within the ANSI by Ball (#50477: TRTE) from the large prairie meadow, and by de Boer (s.n.: WAT?), from the vicinity of Town Line Road, and was recorded by Sutherland (1987) where it was locally common and formed "pure thickets, occasionally intermixed with staghorn sumac." During the survey it occupied the dry sandstone thickets (S-t) and dry, disturbed sites (Ar, Xmt) at UTMs 855561, 861554 and 869556, but was not recorded elsewhere.

Asclepias tuberosa L. - butterfly weed

Sutherland (1987) indicates that this showy perennial herb of dry upland meadows is common in the Norfolk portion of the region, but implies that it is rare elsewhere in the region. He reports it as being "rare and local at the Oriskany Sandstone Formation". Macdonald collected it (#19859: TRTE) at UTM 867552 where several plants grew at the crest of an open, low escarpment (S-e). de Boer et al. (1982) also recorded it in the forests south of Town Line Road.

Hackelia virginiana (L.) Johnston - beggar's-lice

Sutherland (1987) indicates this perennial woodland herb to be common in the Norfolk portion of the region, but rare on the Haldimand Clay Plain. Macdonald collected it (#19793c, 19895: TRTE), and recorded it from several successional and upland forest stations within the ANSI (UTMs 855561, 860555, 863548 and 879548).

Triodanis perfoliata (L.) Nieuwland - Venus' looking glass

This is a provincially delisted upland herb which still is rare in Central Region (Riley 1988). It was first recorded from the ANSI by Alex (1977) at UTM 856554, and his sighting was quoted by subsequent researchers (Beechey 1977, Fahselt et al. 1977, de Boer et al. 1982). de Boer (1988) indicates that this station was probably in the old quarry basin on the eastern side of Dry Lake Road, just north of its intersection with Town Line Road. Sutherland (1987) reports that "In late September 1986, approximately a dozen plants were found at [the Oriskany Sandstone Formation], in fissures in exposed sandstone pavement; ... no specimens were collected as the plants were small and severely desiccated." Sutherland (1989) also indicates his sight record of 18 September 1986 on sandstone pavement in a small opening to the southeast of the above intersection (UTM 862553).

c. REGIONALLY RARE NON-NATIVE TAXA

10 species of Old World herbs which occur within the ANSI are indicated by Sutherland (1987) as being regionally rare. While these are not as truly significant as the above native species, nevertheless, they are of interest. 4 of them are adventives which have become established, at least temporarily, in the dry upland successional meadows, in the forests and on the sandstone pavement: **Bromus mollis*** (soft chess), **Carduus acanthoides*** (plumeless thistle), **Centaurea nigra*** (black knapweed) and **Tragopogon pratensis*** (meadow goat's-beard). The remaining 6 are remnants of former cultivation and habitation, and may be persisting or invading into the surroundings: **Convallaria majalis*** (lily-of-the-valley), **Ornithogalum umbellatum** (star-of-Bethlehem), **Salix caprea*** (goat willow), **Dianthus barbatus*** (sweet William), **Sedum telephium*** (live-forever), and **Aeopodium podograria*** (goutweed). Where information is available, these are mapped within the ANSI in Map 2. Sutherland's (1987) text also lists 3 others as being regionally rare non-natives; however, he recently has indicated that these are now known to be uncommon in the region. They are listed here as a matter of record: **Festuca trachyphylla*** (hard fescue), **Carex spicata*** (sedge), **Viola odorata*** (sweet violet).

d. REGIONALLY NEW NATIVE TAXA

4 native taxa which occur within the ANSI are unreported from the Haldimand - Norfolk Region by Sutherland (1987). These are briefly discussed below.

Crataegus chrysocarpa Ashe - hawthorn

This upland tall northern shrub was recorded by Maycock (1977 a) from the large prairie meadow and the dry to dry mesic forests of his Sites I and II (F-1 2), about UTMs 858561?, 856560? and 857558?. However, while no collections appear to have been made, his field identification is tentatively accepted for this report.

However, it is possible that he was using a broader species concept than that employed by Sutherland (1987), or that, if a field identification, the individual may have been mistaken for other hawthorn species (C. **douglassi**, C. **macrantha**), which themselves are regionally significant (Phipps & Muniyamma 1980). Sutherland (1989) queries Maycock's determination in light of the regional flora, and suggests that any voucher specimens be confirmed.

Hackelia deflexa (Wahlberg) Opiz var. **americana** A. Gray - stickseed

Fahselt et al. (1979) indicates the occurrence of this upland forest herb in the dry mesic oak - hickory forest of Maycock's Site II, about UTM 857557. This species was not encountered during the 1988 survey, although the similar **H. virginiana** was twice collected by the author. No voucher collection is indicated, but Maycock's record is tentatively accepted.

Antennaria neodioica subsp. **canadensis** - smooth small pussytoes

This is a thinly widespread small herb of dry upland sites. It was collected by de Boer (s.n.: WAT) in the ANSI, but no accurate location is given. Macdonald recorded it in a dry oak opening south of the recent quarry development (UTM 859558) in association with several significant prairie-like species. Sutherland (1982) does not distinguish the subspecies in his regional discussion of this species.

Solidago canadensis L. X **S. juncea** Aiton - hybrid goldenrod

This is an interesting hybrid (determined by J.K. Morton 1988) of two upland herb species. Macdonald collected it (#19889: WAT) from the dry oak opening south of the recent quarry development (UTM 859558) in association with several significant prairie-like species.

As well, Sutherland (1989) has indicated that 2 other species inadvertantly were overlooked in the Haldimand - Norfolk flora, and that they are actually widespread and commonin the region. These also are briefly discussed for the floristic record:

Scirpus microcarpus Presl
var. **rubrotinctus** (Fern.) M.E. Jones - blood-stained bulrush

This wetland graminoid herb was recorded by Macdonald (1988) at two locations aroung the western and eastern Dry Lake ponds at UTMs 861541 and 866542, in the successional shoreline situations of the berm of the dam and the slope of the roadbed.

Quercus bicolor X **Q. macrocarpa** - hybrid oak

This hybrid oak of dry upland forest sites was collected by Ball (#16177b: PWB) from the general area of Maycock's Site II (about UTM 857557?).

e. REGIONALLY NEW NON-NATIVE TAXA

5 species and 1 hybrid are not reported from the region by Sutherland (1982). Their occurrence at the ANSI is briefly discussed below:

Salix fragilis* L. X **S. babylonica*** L. - weeping willow

This commonly planted decorative tree was recorded by Macdonald (1988) from a wet thicket along a field edge to the northwest of Dry Lake (UTM 862544). It may have originated from a garden refuse pile, but no habitation was in the vicinity. It probably is escaped in the region more often than the record indicates (Sutherland 1987).

Silene armeria* L. - sweet-William catchfly

This perennial garden herb was collected from the vicinity of the Environmental Protection Area by de Boer (s.n.: WAT), and presumably was confirmed during the course of her thesis project. The specimen was not relocated at WAT, and is accepted with reluctance.

Camelina microcarpa* Andrz. ex DC. - false flax

Maycock (1977 a) records this dry upland herb from the general vicinity of the ANSI, and Ecological Services for Planning (1977) record it from the Environmental Protection Area. It was not encountered during the 1988 survey.

Prunus cerasus* L. - sour cherry

A voucher collection of this fruit-bearing small tree was made by Macdonald (s.n.) and was seen in successional situations within the ANSI (UTMs 859553, 855561). As well Fahselt et al. (1979) recorded it within the dry open forest Maycock's Site I (UTM 856561), and Reznicek noted it from the general area.

Euphorbia exigua* L. - dwarf spurge

This annual European herb was collected by Macdonald (#19760: TRTE) from the very dry roadside sands south of Dry Lake (UTM 862539). This species is only very occasionally recorded in the province, and may be sporadic in its occurrence and persistance at the ANSI.

Artemisia biennis* Willd. - biennial wormwood

This dry upland perennial herb of successional sites was reported from the general area in Maycock's record transcriptions (1977 a), and from the Environmental Protection Zone by Ecological Services for Planning (de Boer et al. 1982). It was recorded by Macdonald on the north side of the small quarry in the ANSI's northwestern corner (UTM 854561).

f. REGIONALLY VERY UNCOMMON NATIVE TAXA

20 species occur within the ANSI which are listed by Sutherland (1987) as being regionally very uncommon, having only 6 to 8 stations in the region. These are listed in Table 2 which indicates their sources, and are mapped in Map 2. The dry oak - hickory forests of the ANSI support 7 of these species, including 2 trees: **Ulmus thomasi** (rock elm), **Quercus muehlenbergii** (chinquapin oak); 1 shrub: **Amelanchier sanguinea** (dwarf Juneberry); and 4 herbs: **Ranunculus hispidus** var. **hispidus** (bristly buttercup), **Arabis canadensis** (sicklepod), **Samolus parviflorus** (water pimpernel) and **Conopholis americana** (squawroot). The circummesic upland forests include one station for a fern: **Dryopteris cristata** (crested woodfern). The sandstone rockland habitats of the area support 2 acid substrate-loving herbs: **Saxifraga virginiensis** (early saxifrage) and **Gnaphalium viscosum** (sticky sweet everlasting). The large prairie meadow which was in the vicinity of the large quarry development is reported by Maycock to have supported the last-named species and two other herbs: **Agalinis paupercula** (small-flowered Agalinis) and **Penstemon hirsutus** (hairy beard-tongue). The wetland habitats of the Dry Lake Basin and the several slough ponds of the ANSI support 5 additional regionally very uncommon species: **Sparganium chlorocarpum** (green-fruited burreed), **Dulichium arundinaceum** (three-way sedge), **Carex projecta** (sedge), **Juncus effusus** var. **solutus** (soft rush) and **Parthenocissus quinquefolia** (lowland Virginia creeper). A variety of upland and lowland sites in the ANSI also support a final 3 species: **Carex brevior** (sedge), **Polygala senega** (Seneca snakeroot) and **Apocynum sibiricum** var. **cordigerum** (clasping-leaved dogbane). As well, Riley (1988) indicates that 3 of these are rare in Central Region: Chinquapin oak, water pimpernel and lowland Virginia creeper.

g. REGIONALLY VERY UNCOMMON NON-NATIVE TAXA

2 non-native species are recorded here, one apparently an old field weed: **Epilobium parviflorum*** (small-flowered willow-herb), and the other a horticultural shrub which has locally invaded the upland forests: **Lonicera morrowi*** (Morrow's honeysuckle).

h. PROVINCIALLY DELISTED NATIVE TAXA

The original claims for the occurrence of provincially rare plants on the Oriskany Sandstone (Fahselt et al. 1979) were based on the early studies of the National Museum (Argus & White 1977). However, this research has since been revised (Argus & White 1982, 1983; Argus & Keddy 1984; Argus et al. 1987), and 15 of their species for the area have been 'delisted'. Subsequent floristic inventory studies of the ANSI have augmented this listing, resulting in a total of 22 provincially delisted species for the area. Nevertheless, several of these species still are of interest in the province, even though most are regionally common or uncommon. These are listed in Table 3, but are not mapped.

Notable among these are 8 which are rare in Central Region and 3 which are restricted there (Riley 1988). These are listed as follows:

rare in Central Region

Asplenium platyneuron (ebony spleenwort)
Eragrostis hypnoides (creeping love grass)
Polygonatum biflorum (Solomon's-seal)

Dioscorea villosa (wild yam)
Lespedeza intermedia (wand-like bush-clover)
Helianthemum bicknellii (Bicknell's frostweed)
Pycnanthemum virginianum (Virginia mountain mint)
Aster pilosus var. **pilosus** (downy white Aster)

restricted in Central Region
Quercus bicolor (swamp white oak)
Cornus florida (eastern flowering dogwood)
Vaccinium pallidum (hillside blueberry)

4. MOSS / LIVERWORT / LICHEN FLORA

The prevalence of a dry acidic rockland environment which is provided by the outcropings of the Oriskany Sandstone Formation attracted the interest of several researchers who were interested in the moss and lichen flora of the ANSI. F.S. Cook (1977) of the University of Western Ontario first reported the occurrence of 6 mosses, Fahselt (1980) later added 14 species, Macdonald (1988) added 1 species, and F.S. Cook's determinations of Macdonald's collections added 9 species, resulting in a total moss flora of 31 species. Macdonald also collected 1 liverwort species which also was identified by Cook (1989). Fahselt (1980) also reported the occurrence of 17 species of lichens on the rocklands within the area, and Macdonald later collected 5 of these (UWO). These are listed in Appendix C.

mosses	liverworts	lichens
31	1	17

Fahselt (1980) documented the occurrence of the moss and lichen species in the forests of Maycock's Sites I, II, III and IV. She found that the moss flora in the 4 sites was about equal in diversity. However, her study and this present study indicated that the dry to dry mesic oak - hickory forests of Sites I and II, successional sandstone pavement thickets and the sandstone escarpment face included 10 species which previously were unreported from anywhere in the Regional Municipality of Haldimand - Norfolk (Ireland & Cain 1975), and most of these occurred directly on outcrops of the sandstone bedrock. 3 of these are significant in that they have only a very scattered distribution in southwestern Ontario: **Grimmia apocarpa, Polytrichum commune** and **P. piliferum.**

Fahselt (1980) also found that the dry to dry mesic oak - hickory forest communities (Sites I, II) had a lichen flora of low diversity, and that the circummesic forests (Sites III, IV) had a flora of a more normal diversity. Furthermore, she recorded the first Ontario station for one species, **Cladonia cylindrica,** from the mesic maple - oak forests of Site IV (community F-11) about UTM 862556.

C. FAUNA

1. INTRODUCTION

The Oriskany Sandstone and Woodlands Area of Natural and Scientific Interest encompasses a fair diversity of natural and successional habitat conditions. Its upland and lowland deciduous forests form one of the larger such expanses in the general vicinity, and provides a corridor for wildlife shelter and movement. The

dominance of nut-bearing trees, such as oaks, hickories, and of other fruiting species, provides a food source for many animals. The Dry Lake basin provides an extensive wetland habitat which creates breeding grounds and draws migratory waterfowl to the area. Finally, the unique bedrock terrain conditions allow a singularly significant population of the threatened Black Rat Snake to occur here.

The fauna of the area initially did not receive the level of attention given to the flora and vegetation by P.F. Maycock and others. The presence of the Black Rat Snake population in the area had been known for well over 20 years prior to its documentation by W.W. Judd (1977). The inventory studies of Ecological Services for Planning (1977) highlighted some information about the wildlife, and the brief studies of C.A. Campbell (1977 a) provided additional information about the snakes, which was summarized in a paper by Fahselt et al. (1979). M. Furber (1980) conducted a more general inventory over a year-long period while he resided in the vicinity, and later supplemented this with additional studies. de Boer et al. (1982) studied the area over two seasons and summarized Furber's and her own findings. Additional incidental observations were made in and around the area by a variety of researchers, such as J. Plank, J.M. Webber (Laudenbach), and residents, such as B. Vanderburg, S. Banticks and others (Allan et al. 1977). The studies in the area by the Haldimand - Norfolk Natural Areas Inventory project uncovered much additional information about the mammals, breeding birds and herptiles. Macdonald made incidental observations of the fauna in the course of his 1988 survey. The faunal species are briefly discussed below, listed in Appendices D, E and F, and the more significant of them are indicated in Table 4.

2. HERPTILES

The initial survey of the herptiles (amphibians and reptiles) within the vicinity of the ANSI was carried out by Furber and was summarized by de Boer et al. (1982), recording 3 amphibians and 6 reptiles. Gartshore (1987 a) and other members of the Haldimand - Norfolk Natural Areas Inventory furthered the survey, and recorded an additional 4 amphibians. Macdonald (1988) recorded his observations and those of area residents (Banticks, Vanderburg), and added a further 3 reptiles. The total herptile fauna at this time is 6 amphibians and 9 reptiles, or 15 species. These are summarized in Appendix D. This compares with a total of 36 species which were recorded within the region during the Haldimand - Norfolk Natural Areas Inventory (Gartshore 1987 a).

The amphibians which are recorded within the ANSI occupy upland forest and wetland habitats. Most of the species are abundant and widespread within the region, and have large populations within the ANSI. The frog species are common around the Dry Lake basin and are successfully breeding there.

The reptiles recorded from the ANSI include 2 turtles and 7 snakes. The turtles (Painted Turtle and Snapping Turtle) and 1 snake (Northern Water Snake) have the wetlands around Dry Lake as their habitat. The other snakes generally are upland species of succesional and forest sites. 5 are regionally uncommon: Eastern Ribbon Snake, Northern Water Snake, Northern Brown Snake, Smooth Green Snake and Eastern Milk Snake.

Of greatest interest is the occurrence of the largest species of snake in Canada: the Black Rat Snake (**Elaphne obsoleta obsoleta**). This species is considered to be nationally, provincially and regionally rare and threatened in Ontario (Cook 1970). Gartshore (1987 a) writes: "Once thought to occur throughout southwestern Ontario, the species is now very rare and confined to a few scattered localities. Campbell

Table 4: Significant Fauna of the Oriskany Sandstone and Woodlands Area of Natural and Scientific Interest

REPTILES

NATIONALLY, PROVINCIALLY AND REGIONALLY RARE, THREATENED

Black Rat Snake	**Elaphne obsoleta obsoleta**

BIRDS

NATIONALLY, PROVINCIALLY AND REGIONALLY RARE SUMMER RESIDENTS

Red-bellied Woodpecker	**Melanerpes carolinus**

NATIONALLY, PROVINCIALLY AND REGIONALLY RARE (STATUS UNKNOWN)

Yellow-breasted Chat	**Icteria virens**
Orchard Oriole	**Icterus spurius**

PROVINCIALLY AND REGIONALLY RARE MIGRANTS

Northern Shoveler	**Anas clypeata**
Cooper's Hawk	**Accipiter cooperii**

REGIONALLY RARE WINTER RESIDENTS

Brown Creeper	**Certhia americana**
Dark-eyed Junco	**Junco hyemalis**
Snow Bunting	**Plectrophenax nivalis**
Evening Grosbeak	**Coccothraustes vespertinus**

REGIONALLY RARE MIGRANTS

American Wigeon	**Anas americana**
Hooded Merganser	**Lophodytes cucullatus**
Northern Harrier	**Circus cyaneus**
Sharp-shinned Hawk	**Accipter striatus**
Herring Gull	**Larus argentatus**
Barred Owl	**Strix varia**
Winter Wren	**Troglodytes troglodytes**
Golden-crowned Kinglet	**Regulus satrapa**
Hermit Thrush	**Catharus guttatus**
Solitary Vireo	**Vireo solitarius**
Nashville Warbler	**Vermivora ruficapilla**
Magnolia Warbler	**Dendroica magnolia**
Yellow-rumped Warbler	**Dendroica coronata**
Black-throated Green Warbler	**Dendroica virens**
Blackburnian Warbler	**Dendroica fusca**
White-throated Sparrow	**Zonotrichia albicollis**
White-crowned Sparrow	**Zonotrichia leucophrys**
Purple Finch	**Carpodacus purpureus**

MAMMALS

NATIONALLY, PROVINCIALLY AND REGIONALLY RARE

[Gray Fox	**Urocyon cinereoargenteus**]

NATIONALLY AND PROVINCIALLY RARE

Opossum	**Didelphis virginiana**
Southern Flying Squirrel	**Glaucomys volans**
Woodland Vole	**Microtus pinetorum**

(1977) summarized its occurrence in southwestern Ontario and considered western Haldimand - Norfolk to be its main centre of abundance."

For many years it has been recorded from the vicinity of the ANSI, but the actual size of the population and its actual habitat requirements still remain unknown. A summary of the sightings is presented in Appendix D. Campbell (1977 a) regards the landforms and vegetation of the sandstone exposures as providing suitable habitat for this species, including food sources, cover and potential hibernation sites.

It has been assumed that the many crevices and small 'caves' in the sandstone bedrock of the sandstone bedrock formation have provided such hibernacula for the species; however, old building foundations and quarry sites may also provide suitable sites. A long-time local resident, Bryan Vanderburg (1988), indicated that he has seen "many" Black Rat Snakes over the past three decades throughout the study area and its immediate vicinity. Further, he said that the snakes appear to congregate and overwinter in the vicinity of the old quarry works on the southern side of Town Line Road (UTM 861552), and possibly also to the north (UTM 864556). He also implied that seeing them within the ANSI was not at all an unusual occurrence.

Campbell (1977 a) recounts that other researchers (Fitch 1963, Stickle & Cope 1947) have found the ranges for breeding pairs of this species to be under 20 ha. Suffling (1988) suggests that, given the extent of suitable habitat in the area, there may be about 15 to 20 pairs at the site, but other researchers do not hazard such an estimate.

Vanderburg (1988) also reports that, in the past, residents in the area tended to kill the snakes, fearing their size, and that during the summer they are occasionally found dead on the two roads in the study area. Campbell notes in Fahselt et al. (1979) that "small populations are always vulnerable, so the entire forest and outcrop complex must be maintained in its present condition in order to maximize numbers."

3. BIRDS

The initial inventory of the bird fauna within the vicinity of the ANSI, done by Furber in 1980, was reported in de Boer et al. (1982), and 132 species were listed. Following this, there were brief incidental surveys until the Haldimand - Norfolk Natural Areas Inventory work of McCracken (1987) and others (Gartshore et al. 1987 a), adding 2 species to the total for the area. Macdonald (1988) made incidental observations on the avifauna during his survey and interviewed local residents, adding 5 species for a total of 139 species. These are summarized in Appendix E, and the more significant are listed in Table 4.

McCracken (1987) noted that most of the resident species in the ANSI had "southern affinities", and "included Yellow-Billed Cuckoo, Red-bellied Woodpecker, Willow Flycatcher, Blue-gray Gnatcatcher, Yellow-throated Vireo, Blue-winged Warbler, Yellow-breasted Chat, and Orchard Oriole. No typically northern species are known from the site." She also noted that the variety of forests and open thickets provided much "suitable habitat for several grassland and scrub species ... also Dry Lake provides habitat for several species."

The Haldimand - Norfolk Natural Areas Inventory conducted a brief breeding bird census, and noted signs of breeding for at least 13 species (Gartshore et al. 1986). However, 67 summer resident species and an additional 17 permanent resident

species are recorded from the area, and in all probability, at least 50 potentially are breeding here. (47 species are confirmed as breeding within the Breeding Bird Atlas square, according to Cadman et al. 1987.) At least one of these species is significant: the Red-bellied Woodpecker (**Melanerpes carolinus**). This is a nationally, provincially and regionally rare species which was first reported from the area by Furber on 9 June 1984, and later noted a territorial pair in June 1985 (McCracken 1987). No habitat or population information was provided. These are among the first sightings in the region for this significant southern woodland bird. Its habitat requirements include dead limbs in live trees for nesting and oaks for foraging (McCracken 1987).

Additionally, 2 other nationally, provincially and regionally rare species are recorded from the area, but their breeding and resident status here is unknown. The first is the Yellow-breasted Chat (**Icteria virens**) which is a rare and very local southern woodland bird that has few documented breeding records in the region. One individual was noted from the ANSI by Furber on 10 June 1981 (North 1981). No location or habitat information within the ANSI is available, but the species prefers thickets around forest edges, clearings, swamps and old fields (McCracken 1987). The second is the Orchard Oriole (**Icterus spurius**), a rare but fairly widespread, open upland site species which is restricted in Ontario to its southern portions. Its regional population appears to have been reduced over the past few decades, perhaps due to the reduction of suitable orchard-like habitat. McCracken (1987) indicates its occurrence in the ANSI, although there is no information on its population.

Also of interest among the summer residents within the ANSI is a population of Turkey Vulture (**Cathartes aura**) which frequents the large, recently abandoned quarry, congregating along its rim and among the talus and shelves, and perching in the surrounding trees. Up to 36 individuals of mixed adults and juveniles were recorded by Macdonald in August and September 1988 as consistantly congregating around this quarry. McCracken (1987) indicates potential nesting in the ANSI or its immediate vicinity by the presence of a pair in suitable habitat; however, no confirmation of an actual nest record is reported.

7 winter resident species are also recorded here. These forage and shelter in a variety of upland habitats. 3 of these are considered to be regionally rare (McCracken 1987), but do not breed within the ANSI. Nevertheless, the habitats provided by the area contribute to their survival in the winter:

Brown Creeper (**Certhia americana**)
Dark-eyed Junco (**Junco hyemalis**)
Evening Grosbeak (**Coccothraustes vespertinus**).

42 species are recorded as being migrants within the ANSI. These include spring and autumn waterfowl which tend to congregate along the shores and in the waters of the Dry Lake basin, and passerines which pass through a variety of upland and lowland habitats. 2 of these are considered to be provincially and regionally rare (McCracken 1987, indicated by asterisks):

Tundra Swan (**Olor columbianus**)
* Northern Shoveler (**Anas clypeata**)
American Wigeon (**Anas americana**)
Hooded Merganser (**Lophodytes cucullatus**)
Northern Harrier (**Circus cyaneus**)
Sharp-shinned Hawk (**Accipter striatus**)
* Cooper's Hawk (**Accipiter cooperii**)
Herring Gull (**Larus argentatus**)

Winter Wren (**Troglodytes troglodytes**)
Golden-crowned Kinglet (**Regulus satrapa**)
Hermit Thrush (**Catharus guttatus**)
Solitary Vireo (**Vireo solitarius**)
Nashville Warbler (**Vermivora ruficapilla**)
Magnolia Warbler (**Dendroica magnolia**)
Yellow-rumped Warbler (**Dendroica coronata**)
Black-throated Green Warbler (**Dendroica virens**)
Blackburnian Warbler (**Dendroica fusca**)
White-throated Sparrow (**Zonotrichia albicollis**)
Purple Finch (**Carpodacus purpureus**).

Also noted during the 1988 survey by Macdonald were calls of the regionally rare Barred Owl (**Strix varia**) in the forests south of Town Line Road. However, rather than being a natural occurrence, these may have come from the owl pens maintained by J. Furber in the vicinity of the Scout Property (UTM 861549), but this was not verified.

4. MAMMALS

de Boer et al. (1982) presented the first reported summary of the mammal fauna of the area, which also was done by Furber (1980). The Haldimand - Norfolk Natural Areas Inventory conducted intensive small mammal trapping and attempted to net bat species (Gartshore 1987 b, Gartshore et al. 1987 a); their work also cites other researchers' studies (Dewar & Furlonger 1985), and added 6 species to the total. The study of Macdonald involved field observations and interviews with local residents (Banticks 1988), and added 3 species, resulting in a total mammal fauna of 26 known species and 4 hypothetical species. These are listed in Appendix F, and the more significant are listed in Table 4.

Gartshore (1987.b) indicates that "large numbers of bats concentrated at an old glass-mining pit that is located at this site" (UTM 857554) which she surmised was used as a hibernaculum. Records from here included 49 Little Brown Bats, 32 Northern Long-eared Bats, 1 Big Brown Bat, some Small-footed Bats, and possibly a Hoary Bat.

3 species recorded from this ANSI are regarded as being significant. 1 is nationally and provincially rare (Opossum), and two are nationally rare (Southern Flying Squirrel and Woodland Vole).

Opossum (**Didelphis virginiana**) was reported from the ANSI by Furber (de Boer et al. 1982), and Banticks indicates a permanent population of this small woodland marsupial in the woodlands east of Dry Lake Road.

Southern Flying Squirrel (**Glaucomys volans**) is a regionally common woodland mammal which is listed as a COSEWIC candidate species and is nationally rare in Canada. Furber (de Boer et al. 1982) and Gartshore et al. (1987 a) indicates that they were seen or heard on several occasions, and Gartshore (1987 b) reports that one was inadvertantly caught in a mist net set for bats.

Woodland Vole (**Microtus pinetorum**) is a Carolinian woodland species which is nationally and provincially rare in Canada and Ontario. Gartshore (1987b) indicates that an individual "was obtained in 1984 from a woodlot" at the ANSI by Furber. Additionally, she indicates that one individual was caught by M. Odejans in dry hawthorn field and oak woods habitat in October 1986.

Four species reports for the ANSI cannot be confirmed and must remain as hypothetical records:

A report for Small-footed Bat (**Myotis leibii**) is indicated by Gartshore (1987 b) who cites Dewar et al. (1985) who apparently detected and identified the calls, and netted two individuals on 29 Aug. 1985. However, she maintains these as hypothetical occurrences since the individuals were released before verifying measurements or photographs could be taken. She surmises that the species may hibernate in suitable crevices within the ANSI.

Hoary Bat (**Lasiurus cinereus**), a solitary bat, is reported from the ANSI by Gartshore (1987 b) as a possible occurrence based on the identification of its calls and sightings; however, she maintains this only as a hypothetical record since no individuals were caught for confirmation.

Porcupine (**Erethizon dorsatum**) was credited to Furber by de Boer et al. (1982) who indicated the occurrence of this species in the ANSI, but no additional information is provided. Neither Banticks nor Vanderburg recall having seen evidence of this species in the past three decades. Gartshore (1987.b) maintains this species as hypothetical within the region.

Gray Fox (**Urocyon cinereoargenteus**) is a distinctive woodland species which is officially recognized as nationally rare in Canada by COSEWIC and provincially rare in Ontario by the Ontario Ministry of Natural Resources (1986). Gartshore (1987 b) indicates that it is regionally rare as well. Banticks (1988) indicates a single sighting of "a grey-coloured fox" in the ANSI in the past 5 years. This may have been a Gray Fox; however, lacking positive determination, it is presently accepted only as hypothetical for the ANSI.

III: PLANNING CONSIDERATIONS

A. SIGNIFICANT FEATURES

1. INTRODUCTION

Those natural features which should be of paramount importance in any consideration for the preservation and protection of this area are those which truly are of natural and scientific interest at a national, provincial and regional level of significance.

The Oriskany Sandstone and Woodlands ANSI has been identified as having geological, vegetational and biological significance through the research of various authorities on the province's geology, vegetation, flora and fauna. Its significance lies in the following: this is the only outcrop of the Oriskany Sandstone in Ontario; the karst landforms associated with this bedrock are of interest; the natural vegetation associated with the sandstone includes communities which are unique in Ontario; the flora includes several nationally and provincially rare species; and the fauna includes a threatened, rare snake population.

The major significant features for each of these categories are briefly discussed below. Additional information may be obtained within the text of Chapter II and in the Appendices to this report. This information is analyzed to indicate those portions of the ANSI which support the greatest concentrations of those significant features that contribute to the representation of life and earth science themes within the province's system of ANSIs.

2. EARTH SCIENCE FEATURES

Studies of Winder (1977 a), Davidson (1977) and others have identified within the ANSI and its immediate vicinity 6 geological and geomorphological features which are of earth science significance or interest (Figure 3).

- o Oriskany Sandstone Bedrock - the only outcrop of this formation in Ontario; 90% of total natural exposure is within the ANSI
- o Dry Lake Basin Sink Complex - large example of this solution / collapse feature; occupies half of the ANSI's southern arm
- o Onondaga Escarpment - the western end of this Niagara Peninsula escarpment; in northeastern portion of ANSI
- o Clay Knolls - unexplained low circular mounds; 17 in ANSI and immediate vicinity
- o Low Secondary Escarpments - 2 m to 3 m high escarpments with fossil features; 3 in the ANSI
- o Local Sinkhole Collapses - relatively undisturbed small karst features; 3 areas in ANSI
- o Drumlins - western edge of drumlin field; barely touches on the ANSI

These are briefly discussed below. The first 2 of these features are considered to be provincially significant, and the following 4 are regionally significant.

PROVINCIALLY SIGNIFICANT EARTH SCIENCE FEATURES

The Oriskany Sandstone is at or very near the surface in the ANSI's central and western portions. While it has been subjected to past and recent quarry development activities, there are several surface exposures (UTM 856554, 862553, 864553, 867553) and, within the recent quarry (UTM 860562) and along the escarpment exposures (UTM 853552, 857558, 867552), there are excellent cross-sections of the diagnostic lithological and fossiliferous features.

The Dry Lake Basin supports a sink-hole complex (500 m X 700 m) which is one of the largest features of its kind in the Central Region. The subsurface groundwater features are reported to be spectacular, periodically producing an artesian-like fountain in the southwestern pond (Vanderburg 1988), and generally causing a considerable fluctuation of the water level within the basin. Recent water control management to regulate the pond levels to benefit waterfowl habitat may have diminished these effects. The next-nearest similar karst features occur about 17 km to the southwest near Port Dover.

REGIONALLY SIGNIFICANT EARTH SCIENCE FEATURES

The Onondaga Escarpment presents a 5 m high, northeastward slope in the northeastern portion of the ANSI. This marks the western end of this escarpment which extends along the southern portion of the Niagara Peninsula and into New York State. It generally is under forest or plantation cover within the ANSI.

The clay knolls are 2 m to 5 m high, 15 m to 24 m diameter clay loam features of unknown origins, but possibly are related to the karst features or postglacial history. These are not reported elsewhere within the Region. 15 of them occur within the Life Science ANSI, and the remaining 2 are in the Earth Science ANSI extensions.

Low secondary escarpments occur in several localities of the ANSI (UTMs 853552, 857558, 867552). These generally appear to be of natural occurrence, and are 1 to 3 m high. At least the westernmost example is associated with collapse features and is notably fossiliferous. There is some controversy about the origins of that escarpment at UTM 857558; while it appears to be of natural occurrence, Fraser (1988) suggests that it is a quarry-face.

Local Sinkhole Collapse features occur in 3 portions of the ANSI (UTMs 856559, 862552, 862558). That in the northern portion of the ANSI's southern arm is the best developed, with at least 6 collapse depressions of over 1.5 m depth which extend into solution planes as small 'caves'. These possibly extend southward toward the Dry Lake Basin, with their surficial expression being the several linear depressions which support 'spring swamps', which may reflect subsurface collapse features.

3. VEGETATION FEATURES

The vegetation research of Maycock (1977 a) and others emphasized the significance of those oak - hickory forests which occurred on the dry sandstone sites of the area. Further studies (Ball 1977, de Boer et al. 1982, this study) also recognized the significance of other upland forests and of lowland and wetland features (Figure 6). This inventory (Macdonald 1988) recognizes 63 community patterns within the study area, based upon their substrates, composition, community structure and developmental history (Table 2, Map 1).

Undoubtedly, the most significant communities are those which are associated with, and dependent upon, the surficial and near surface exposures of sandstone bedrock. Such substrate and environmental conditions do not occur elsewhere in Ontario, and while they may superficially resemble others on limestone or clay substrates, the community structure and species diversity of the vegetation is distinctive (Maycock et al. 1977). The communities identified within the ANSI which correspond to these features are the dry, undisturbed oak - hickory dominated forests and their associated features. These are considered to be provincially significant, and are briefly described as follows:

UPLAND FOREST COMMUNITIES

F-0 (Very Dry) - Dry: Oak Opening

These are local openings in the dry forest cover which are very rich in nationally, provincially and regionally significant species. Excellent examples are south of the recent quarry development (UTM 859558), and in the vicinity of the older glass works (UTM 862552). Additionaly, there are several other examples in the ANSI (UTMs 857560, 858555, 863557).

F-1 Dry: Forest
Red Oak - White Oak - Shagbark Hickory

This is the community identified by Maycock in his Sites I and II as being significant. It is the most extensive single community in the ANSI (52.39 ha.), and occurs in several portions, with a large band about the recent quarry development (UTMs 856651 to 860556 to 862564), in the eastcentral portion (UTM 865558) and also in the southern arm (UTMs 861547, 863551). These generally are intermediate in age class, but that at UTM 861547 is submature. Disturbance from cutting generally is light and local.

F-2 Dry: Disturbed Forest
Red Oak - White Oak - Trembling Aspen - Shagbark Hickory - Black Cherry

This is perhaps an open phase of the above dry forest community. Maycock may have included some of its features in his Site I samples (UTM 856560). It presents definite exposures of the sandstone bedrock as the substrate. There appears to have been moderate disturbances to this community in the past decade.

F-3 Dry - Dry Mesic: Forest
. Red Oak - Bitternut Hickory - White Pine - Chinquapin Oak - Red Maple - White Oak

This phase of the dry oak - hickory forests is restricted to the northeastern portion of the ANSI (UTM 863565). It includes a notable presence of Chinquapin oak and eastern white pine. There is little recent disturbance here; however, the adjacent communities (F-7, F-10) have been severely cut in the past decade.

F-4 Dry - Mesic: Sink Hole Mosaic Forest
Red Oak - White Oak - Red Maple - Sugar Maple - Black Cherry - Large-toothed Aspen - American Beech

This is a phase of the oak - hickory dry forest which is more intimately associated with the local collapse features in the bedrock. It is located in 2 areas in the ANSI (UTMs 856559, 862552), and that in the southern arm presents a very good range of collapse landform and vegetation features.

F-5 Dry Mesic: Forest
Red Oak - White Oak - Sugar Maple

This is the less xeric phase of the oak - hickory forest communities. It occurs on slightly thicker soils, often as inclusions in the dry stands (UTMs 857556, 858559, 858563, 859551, 861557, 862561, 863556). The oaks tend to be dominant in the over canopy, with maples attaining an increased importance in the lower canopy.

Also of importance are those circummesic forest communities which are associated with the sandstone substrate, albeit often with thicker soils and a less dramatic relationship than in the dry forests, and those occur in association with the Oriskany Escarpment. These are considered to be regionally significant. 3 such communities are identified in the ANSI, as follows:

F-9 Dry Mesic - Mesic: Forest
Red Maple - Red Oak - White Oak - Sugar Maple - American Beech - Shagbark Hickory - Bitternut Hickory - Eastern White Pine

This is a submature forest located in the northeastern portion of the ANSI (UTM 865565). It has a composition which was not recorded elsewhere in the ANSI. It was studied by Maycock (Site V) and de Boer (Area D), and Reznicek discovered 2 nationally and provincially rare plants there.

F-11 Mesic: Forest
Sugar Maple - Red Oak - White Ash - American Beech

This is a community which is widespread within the region, and is mainly located in several portions of the southern arm of the ANSI (UTMs 853554, 862550, 866544, 866547). These stands tend to be intermediate in age, and have had some light to moderate disturbance in the past. Those stands at UTMs 862550 and 866545 are well developed with a somewhat older age class and an interesting diversity of community structures and component species.

F-12 Mesic: Managed Forest
Sugar Maple - (Red Ash - White Ash)

This community also is widespread within the region, and has several stands within the ANSI (UTMs 867542 to 871548, 854552, 864563). It generally has experienced severe cutting with the removal of all but sugar maple; however, that stand which occupies the basin at the foot of the Onondaga Escarpment at UTM 864563 is well developed, and is of interest.

Also associated with the very thinly soiled limestone bedrock of the ANSI's eastcentral edge is a young, successional dry forest which displays considerable potential for developing into an interesting community. This should be regarded to be at a regional level of significance:

F-6 Dry Mesic: Successional Forest Complex
Sugar Maple - Red Oak - White Oak - Shagbark Hickory - White Ash - Large-toothed Aspen

This young forest is located about UTM 870554. It has been severely cut in the past decade; however, it retains many of its component species, and it presents a mixed bedrock and thin soil cover substrate. It may be threatened by the adjacent Cayuga quarry development.

Non-forest communities occurring in direct association with the sandstone exposures include barrens, meadows and thickets. These often have a characteristic species complement which includes nationally, provincially and regionally significant species. Unfortunately, virtually all of these communities have experienced considerable disturbances from past agricultural and quarrying activities. Nevertheless, they are the only remants of what once probably was a very distinctive feature, and should be regarded as having provincial significance potential.

SANDSTONE PAVEMENT COMMUNITIES

S-o Arid - Very Dry: Sandstone Pavement Barrens
S-m Very Dry: Sandstone Pavement Meadow
S-t Very Dry - Dry: Sandstone Pavement Thicket

These three communities invariably occur in association with each other. They are characterized by a distinctive species complement which includes several Regionally Significant species. Unfortunately, due to the degree of disturbances, many adventive 'weedy' species are included here. Good examples occur off the Town Line Road, at UTMs 856554, 857553, 860554, 862553, 865554, 868553. The last two locations indicated occur within the boundaries of the Environmental Protection Zone of the recent quarry development. These appear to have been considerably disturbed by traffic and grazing, but they do support a variety of many of the characteristic species. However, better and more extensive examples are those to the south of Town Line Road. In some instances, the older quarry sites also supported these species, making it difficult to differentiate between them.

SUCCESSIONAL COMMUNITIES

X-p Very Dry - Dry: Old Field Prairie Inclusions

While about 10% of the ANSI's surface area supports successional old field

meadow, thicket and grove communities, a very small portion of this includes what are perhaps remnants of the prairie-like communities which once occurred in the region. Only 3 such areas were located in the ANSI, both on the west side of Dry Lake Road (UTMs 855559, 855560, 856557).

LOWLAND COMMUNITIES

The several lowland and wetland communities associated with the Dry Lake Basin and the slough depressions also are of significance. The Haldimand Clay Plain Physiographic Region is partially characterised by the presence of slough depressions. Those in the ANSI occur at the western edge of this physiographic region. The large swamp forest here also is of interest. The 3 communities represented here are of regional significance:

L-b Very Wet - Saturated: Slough Thicket
Buttonbush

L-g Wet Mesic - Wet: Slough Fringe Grove
Silver Maple - Green Ash - Swamp White Oak - White Elm - Willow

The buttonbush thickets which occupy the sloughs and the deciduous groves which form a fringe around them are well developed in the ANSI. 6 such slough features occur here (UTMs 863544, 864546, 864547, 864563, 865564, 866566). Those at UTMs 863544, 864546 and 865564 are best developed with a variety of regionally significant species and well developed community structures. All of the sloughs here have been subjected to agricultural draining, but their features appear to be only lightly disturbed.

L-2 Wet: Swamp Forest
Silver Maple - Green Ash - White Elm - Swamp White Oak

The swamp forest which occupies the northern part of the Dry Lake Basin is intermediate aged and has suffered from some cutting the the past. Nevertheless, it is representative for the region, it includes a small stand of a nationally and provincially rare shrub, and its tree cover includes notable concentrations of swamp white oak.

WETLAND BASIN COMMUNITIES

The ponds within the Dry Lake Basin would be quite typical of such features if it were not for the distinctive, periodic fluctuation of the water levels here, caused by the groundwater surges indicated above. This environment has allowed at least 1 of its communities to attain provincial significance:

W-w Wet: Pond Fringe Drawdown Meadow

The zone surrounding the pond which experiences progressive drawdown over the growing season is distinctive in its support of a provincially rare species which is strongly dependent upon this environment for its survival. Further, this exposed terrain provides appropriate shorebird habitat for migrating species.

PRAIRIE COMMUNITY

The studies of Maycock and Ball in 1977 described a relatively large prairie meadow in the forest opening of the ANSI's northwestern portion (UTM 858562). Unfortunately, this feature was destroyed during the expansion of the recent quarry development. It would have been an additional provincially significant community for the ANSI:

PP Very Dry - Dry: Prairie Meadow

Maycock and Ball recorded 29 representative 'dry prairie' species from this meadow, including 4 nationally and provincially rare, and 7 regionally significant plants. It probably was somewhat disturbed by farming and preliminary quarry exploration prior to its discovery.

QUARRY COMMUNITIES

The successional development onto the sandstone substrates of the area is of interest to many researchers, particularly from the point of view of land rehabilitation and determining the ability of species to survive in such an environment. 5 of the quarry communities may present such an opportunity for study, and in this light could be regarded as having regional significance:

Q-o Arid: Recent Scraped Bedrock Pavement Preparation Barrens
Q-x Arid - Very Dry: Old Scraped Bedrock Pavement Preparation Barrens / Meadow

The initial and later successional patterns onto exposed sandstone and limestone pavements are displayed in these communities. Good examples are located aroung the recent and older quarry developments and south of Town Line Road (UTMs 857553, 858554, 860561). These sites also support several regionally significant species.

Q-q Arid - Very Dry: Quarry Basin Barrens / Meadow Complex
Q-t Very Dry - Dry Mesic: Quarry Basin Thicket / Meadow Complex

Several locations in the ANSI provide quarry pit features which currently are undergoing early to middle succession. These occur in association with the above quarry pavement situations at UTMs 855561, 858554, 856554, 860561, 862553).

Q-f Dry Mesic - Mesic: Quarry Tip Pile Forest Complex

The piles of rubble from the old quarry operations support middle to later successional communities, notably mixed forests (UTMs 857554, 861554, 864557). These present developing communities which are of interest in their community structures. They also support several regionally significant species.

4. SIGNIFICANT FLORA

Floristic research was conducted within the ANSI and its vicinity by many botanical authorities, notably Ball, Maycock, de Boer, Suffling, Alex, Sutherland, Kaiser, Macdonald and others. The total flora for the study area is 627 species,

including 8 hybrids, 11 infraspecific taxa and 144 non-native species. Most of the species are of a southern affinity. As well, there is a representative complement of Carolinian species, and a few northern species. Notable are the records for 29 characteristic 'dry prairie' species from the former prairie meadow, 16 of which do not occur elsewhere within the ANSI. Additionally, about 23% of the species have Old World origins.

Identified within the study area for the ANSI are 71 species which are significant, including 12 which are nationally and provincially rare (according to the National Museum), 27 which are regionally rare (1-5 stations in Haldimand - Norfolk), 22 which are regionally very uncommon (6-8 stations), and 10 which are newly discovered in the region. These are briefly discussed below, and further information appears in the text (Chapter II B, Table 3, Map 2, Figure 8, Appendices A, B and C).

Nationally and provincially rare species include 1 tree, 2 shrubs and 9 herbs. 5 of these species also are regionally rare, and within Central Region all are rare and 8 also are restricted (Riley 1988), They occur in a variety of habitats, including 1 in upland dry forests, 3 in upland circummesic forests, 1 in lowland communities, 5 in prairie-like meadows and dry forest openings, 1 in successional communities, and 1 in open wetland communities. Only 7 of the species were relocated within the ANSI during the present inventory, and 4 probably are still present in their former habitats. However, 1 is probably extirpated from the area: **Linum virginianum**; its only reported station is the former prairie. Concentrations of these rare species occur around the Dry Lake Basin (UTM 864544), south of Town Line Road (UTM 862552), north of Town Line Road (UTM 864556), south of the recent quarry (UTM 859559) and in the ANSI's northeastern corner (UTM 865565).

Carex gracilescens Steudel - sedge
Possibly at 3 stations (UTMs 865565?, 862556?, other?) in circummesic forests (F-9, F-11?, other?); rare in Central Region; not relocated

Castanea dentata (Marshall) Borkh. - American sweet chestnut
1 station (UTM 865558?) in dry forest (F-1?); rare and restricted in Central Region; not relocated

Crataegus dodgei Ashe - hawthorn
1 station (UTM 862553) in old field south of Town Line Road "on sandstone pavement" (S-t); also regionally rare

Desmodium rotundifolium (Michaux) DC. - prostrate tick-trefoil
4 stations (UTMs 857558?, 860559, 868561, other) in the former prairie meadow (PP), "sandstone outcrop", oak opening (F-0) and dry forest (F-1); also regionally rare, and rare in Central Region; sparse populations, susceptable to disturbances

Disporum lanuginosum (Michaux) Nicholson - yellow mandarin
Many stations (UTMs 862551, 862552, 864564, 867543, 867557, 869548) in dry and circummesic forests (1? 4 5 9 11 12); rare and restricted in Central Region; healthy widespread populations

Frasera caroliniensis Walter - American columbo
2 stations in ANSI (UTM 853558, 865565) in dry and circummesic forests (F-6, F-9); also regionally rare; rare and restricted in Central Region; not relocated

Galium pilosum Aiton - hairy bedstraw
At least 6 stations (UTMs 857553, 857560, 860559, 862552, 864556, 868554); in circummesic forests (F-11, F-12), sandstone thicket (S-t) and the former prairie meadow (PP); rare and restricted in Central Region; healthy populations

Lechea villosa Ell. - hairy pinweed
1 station reported by Sutherland (1989) south of Town Line Road (UTM 862552) in very dry meadow (S-m); rare and restricted in Central Region

Linum virginianum L. - Virginia yellow flax
1 station (UTM 868561) in the former prairie (PP); also regionally rare; rare in Central Region; not relocated; probably extirpated

Ludwigia polycarpa Short & Peter - many-fruited false loosestrife
5 stations around Dry Lake (UTMs 862542, 863540, 864540, 864541, 865542) in the exposed shoreline of the ponds (W-w); also regionally rare; rare and restricted in Central Region; over 100 reproducing plants in 12 separate groups; dependent upon drawdown environment in Dry Lake Basin

Viburnum recognitum Fernald - southern arrowwood
2 stations (UTMs 865547, 866547) in wet lowland forests (L-1, L-2); rare and restricted in Central Region; 3 groups of shrubs, possibly being shaded out

Viola palmata L. var. **palmata** - early blue wood violet
4 stations (UTMs 856563?, 857555?, others) in the former prairie (PP), successional thicket (X-t?), dry forest (F-4?) and circummesic forest (F-11); rare and restricted in Central Region; not relocated

Regionally rare species include 17 native species and 10 non-native taxa. As well, 6 of these species are rare in Central Region, and 1 is restricted. These span a variety of habitats within the ANSI, with several occurring in upland dry and circummesic forests and in successional communities, 1 in wetlands, 7 in sandstone and quarry pavements and 3 in the former prairie. All but 4 species were relocated within the study area during 1988, but they probably still exist in their former habitats. Concentrations of these species occur south of Town Line Road (UTM 862553), north of Town Line Road (UTMs 861554, 867553), east of Dry Lake Road (UTMs 856561, 8575554), south of the recent quarry (UTM 859558) and in the northeastern corner of the ANSI (UTM 866563).

Asclepias tuberosa L. - butterfly weed
rare in the Haldimand portion of the region; possibly 2 stations in the ANSI (UTMs 867552, other) in sandstone meadow habitats

Bromus kalmii A. Gray - Kalm's brome grass
1 station (UTM ?) in vicinity of recent quarry; not relocated

Crataegus holmesiana Ashe - hawthorn
1 station (UTM 865541) in upland circummesic forest (F-11); single shrub recorded, but possibly more frequent

Deschampsia flexuosa (L.) Trinius - common hair grass
3 stations (UTM 858554, 862552, 862553) in sandstone barrens (S-o) and low escarpments (S-e); scattered, apparently healthy plants; a northern

species

Desmodium cuspidatum (Willd.) Loudon - long-bracted tick-trefoil
At least 3 stations in ANSI (UTM 860558, others) from oak openings (F-0) and rocky fields (?); sparse populations at each station; susceptable to disturbance; rare in Central Region

Desmodium paniculatum (L.) DC. var. **paniculatum** - panicled tick-trefoil
Over 6 stations (UTM 855560, 857555, 859556, 859558, 859559, 862553, 864556) in sandstone barrens (S-o), successional communities (X-p, X-l), dry forests (F-0, F-4, F-5) and former prairie (PP); scattered plants in healthy populations; rare in Central Region

Geranium bicknellii Britton - Bicknell's cranesbill
Many stations in ANSI (UTM 855554, 858554, 861554, 862553, 863553, 863554, 865556, 867552, others) in association with sandstone barrens (S-o), quarry pavements (Q-o) and other communities; vigorous populations

Hackelia virginiana (L.) Johnston - beggar's-lice
Rare in Haldimand portion of region; 4 stations in ANSI (UTM 879548, 863548, 860555, 855561) in successional and upland forest sites

Lilium philadelphicum L. - wood lily
1 station (UTM ?) on sandstone rocklands (?); not relocated

Polypodium virginianum L. - common polypody
3 stations (UTM 854552, 856560, other?) in dry and circummesic forests on bedrock (F-2, F-12)

Populus deltoides Marshall X **P. tremuloides** Michaux - hybrid poplar
1 station (UTM 857555) on "sandstone pavement along woodland edge" (Q-f?); restricted in Central Region; not relocated

Potentilla arguta Pursh - prairie cinquefoil
2 stations (UTM 858561, 860554) in former prairie (PP) and sandstone pavement meadow (S-m); rare in Central Region; recorded only once, possibly elsewhere

Rubus pensilvanicus Poiret - Pennsylvania raspberry
Many stations throughout ANSI (UTM 854561, 858553, 862561, 863539, 863552, 864543, 865541, 865556, 866547, 869553) in upland forests, successional communities and others; rare in Central Region,but probably more common in region than reported

Rhus X borealis (Britton) Greene - hybrid sumac
Several stations (UTM 861555, others) in sandstone thickets (S-t) and other communities; reported to be "locally common" in ANSI, but recorded only once in 1988

Rhus glabra L. - smooth sumac
Several stations in ANSI (UTM 855561, 861554, 869556, others) in dry sandstone pavement and disturbed site meadows and thickets (S-t, X-m, X-t); rare in Central Region; local healthy populations; occasionally hybridizing with staghorn sumac

Sparganium americanum Nuttall - American burreed
1 station (UTM 866563) at edge of slough meadow (L-m); several fruiting

plants recorded

Triodanis perfoliata (L.) Nieuwland - Venus' looking glass
At least 2 stations (UTM 856554, 862553) on sandstone pavement in old quarry (Q-x?, S-o); last recorded in 1986 as "a dozen plants" which were severely dessicated; rare in Central Region

The non-native species which are regionally rare do not hold the same level of significance as do the native species; however, they are of interest. Several have become established from cultivation and habitation; others are 'weeds' which have been introduced into a variety of upland and lowland communities:

Aegopodium podograria* L. - goutweed
Bromus mollis* L. - soft chess
Carduus acanthoides* L. - plumeless thistle
Centaurea nigra* L. - black knapweed
Convallaria majalis* L. - lily-of-the-valley
Dianthus barbatus* L. - sweet William
Ornithogalum umbellatum* L. - star-of-Bethlehem
Salix caprea* L. - goat willow
Sedum telephium* L. - live-forever
Tragopogon pratensis* L. - meadow goat's-beard

Regionally New species include the 10 occurring in the ANSI which have not previously been reported from the Haldimand - Norfolk Region by Sutherland (1987). In several cases these may have not been included in his list where he did not accept former records or where subspecies, hybrids and apparent introductions were not considered. As well, Sutherland (1989) indicates that since publication of his study, several previously listed species have been discovered to have been more common than previously thought (see Chapter II B 3 d and e). 4 native species are recorded within the ANSI, including 1 tree, 1 shrub and 3 herbs.

Antennaria neodioica Greene
subsp. **canadensis** (Greene) Bayer & Stebbins - smooth small pussytoes
At least 2 stations (UTM 859558, other) in oak openings (F-0)

Crataegus chrysocarpa Ashe - hawthorn
Possibly 3 stations (UTM 857558?, 858561?, 586560?) in the former prairie (PP) and dry forests (F-1, F-2?); recorded by Maycock but not relocated

Hackelia deflexa (Wahlberg) Opiz var. **americana** A. Gray - stickseed
1 station (UTM 857557?) in dry forest (F-1?); not relocated

Solidago canadensis L. X **S. juncea** Aiton - hybrid goldenrod
1 station (UTM 859558) in oak opening (F-0); single plant recorded

6 non-native regionally rare taxa (including a hybrid) were recorded from a variety of disturbed communities. 3 of these have escaped from cultivation, and 3 are of a 'weedy' occurrence.

Artemisia biennis* Willd. - biennial wormwood
Camelina microcarpa* Andrz. ex DC. - false flax
Euphorbia exigua* L. - dwarf spurge
Prunus cerasus* L. - sour cherry
Salix fragilis* L. X **S. babylonica*** L. - weeping willow
Silene armeria* L. - sweet-William catchfly

20 native species which are regionally very uncommon are recorded from the ANSI. These occupy a variety of habitats, including 5 from upland forests, 2 from successional communities, 5 from wetland communities, 1 from sandstone pavements and cliffs, and 4 from the former prairie. 6 of these species were not relocated in 1988; however, with the exception of those from the former prairie, most of them probably still exist in their former habitats. As well, 3 of these are rare in Central Region.

Agalinis paupercula (A. Gray) Britton - small-flowered Agalinis
1 station (UTM 858561) in the former prairie; not relocated

Amelanchier sanguinea (Pursh) DC. (complex) - dwarf Juneberry
3 stations (UTM 857556, 8615554, other) in sandstone barrens (S-o), successional thickets (X-s) and upland forest (F-11) communities

Apocynum sibiricum Jacquin
var. **cordigerum** (Greene) Fernald - clasping-leaved dogbane
1 station (UTM 8565557) in prairie meadow (X-p)

Arabis canadensis L. - sicklepod
4 stations (UTM 856559, 856561?, 862552, other) in dry and circummesic upland forest communities (Q-f, F-1?, F-4, F-11)

Carex brevior (Dewey) Mack. - sedge
1 station (UTM ?) reported by Maycock; not relocated

Carex projecta Mack. - sedge
4 stations (UTM 864547, 865543, 866563, other) in lowland forest and thicket communities (X-w, L-1, L-2, L-b)

Conopholis americana (L.) Wallroth - squawroot
Possibly 2 stations (UTM 856561?, 862553?) in dry forests (F-1); not relocated

Dryopteris cristata (L.) A. Gray - crested woodfern
1 station (UTM ?) in wet depression in dry successional forest (F-6)

Dulichium arundinaceum (L.) Britton - three-way sedge
1 station (UTM 866563) at edge of slough meadow (L-m)

Gnaphalium viscosum Humbolt, Bonpland & Kunth - sticky sweet everlasting
At least 2 stations (UTM 858562, other) in former prairie (PP) and sandstone pavement (S-m?); not relocated

Juncus effusus L. var. **solutus** (Fernald & Wiegland) Hamit-Ahti - soft rush
3 stations (UTM 865564, 866563, 866566) at margins of lowland meadow and spring swamp communities (L-4, L-m)

Parthenocissus quinquefolia (L.) Planchon - lowland Virginia creeper
Possibly several stations (UTM 866563, others?) in lowland communities (L-4, L-b); rare in Central Region

Penstemon hirsutus (L.) Willd. - hairy beard-tongue
2 stations (UTM 858562, other) in former prairie (PP) and dry oak openings (F-0)

Polygala senega L. - Seneca snakeroot
1 station (UTM ?) reported by de Boer; not relocated

Quercus muehlenbergii Engelmann - Chinquapin oak
Many stations in ANSI with concentrations about UTMs 857557, 863565, 869553 in a variety of dry forests and successional communities; rare in Central Region

Ranunculus hispidus Michaux var. **hispidus** - bristly buttercup
1 station (UTM 857561?) in dry forest (F-1); not relocated

Samolus parviflorus Raf. - water pimpernel
1 station (UTM 865542) in successional lowland forest (L-1); rare in Central Region

Saxifraga virginiensis Michaux - early saxifrage
Many locations (UTM 856554, 857553, 862553, 863553) in sandstone barrens (S-o)

Sparganium chlorocarpum Rydberg - green-fruited burreed
1 station (UTM 864541) in Dry Lake Basin drawdown meadow (W-w)

Ulmus thomasi Sargent - rock elm
1 station (UTM ?) reported by Maycock; not relocated

Only 2 regionally very uncommon non-native species are recorded from the ANSI:

Epilobium parviflorum* Schreber - small-flowered willow-herb
Lonicera morrowi* A. Gray - Morrow's honeysuckle

Finally, the studies of Fahselt (1980) indicate one lichen species for which this area was the first record from Ontario: **Cladonia cylindrica** in the upland circummesic forest (F-11) about UTM 862556.

5. SIGNIFICANT FAUNA

Faunal research on the herptiles, birds and mammals within the ANSI and its vicinity was conducted by several authorities, notably Furber, Campbell, Gartshore and McCracken. Their work identified 7 amphibians, 9 reptiles, 139 birds and 26 mammals, as well as several tentative occurrences. Most of these are widespread species in central and eastern North America. Several reflect the southern and Carolinian characters of the region and its habitats.

The study area for the ANSI provides at least temporary habitat for 32 species which are significant, including 9 species which are regarded by COSEWIC and others as being nationally and provincially rare, and 24 which are regionally rare. These are briefly discussed below, and further information appears in the text (Chapter II C, Table 4, Figure 9, Appendices D, E and F).

The most significant animal species occurring here is the Black Rat Snake which is considered to be nationally, provincially and regionally rare and threatened. While its population size and condition are not fully understood, regular sightings of

adults and juveniles apparently are made within the immediate vicinity, at least one winter hibernaculum has been suggested (UTM 864556), and the present size and condition of the habitat features in the area may be adequate for maintaining at least a small population.

The bird fauna of the area includes 3 nationally, provincially and regionally rare species; however, only 1 of these is confirmed as being a summer resident which probably is breeding on the site: Red-bellied Woodpecker. The other 2 have been recorded in the past, but no evidence of residency is available: Yellow-breasted Chat and Orchard Oriole. These species require upland forest and successional thicket habitats for their successful establishment. Of interest are 2 provincially and regionally rare migrants: Northern Shoveler and Cooper's Hawk, and 18 regionally rare migrants: American Wigeon, Hooded Merganser, Northern Harrier, Sharp-shinned Hawk, Herring Gull, Barred Owl, Winter Wren, Golden-crowned Kinglet, Hermit Thrush, Solitary Vireo, Nashville Warbler, Magnolia Warbler, Yellow-rumped Warbler, Black-throated Green Warbler, Blackburnian Warbler, White-throated Sparrow, White-crowned Sparrow and Purple Finch. As well, there are 4 regionally rare winter residents: Brown Creeper, Dark-eyed Junco, Snow Bunting and Evening Grosbeak. The relatively high diversity of communities here greatly contributes toward providing habitats for these species throughout all the seasons.

The mammal fauna of the area includes 3 nationally and provincially rare species which generally inhabit its upland forest sites: Opossum, Southern Flying Squirrel and Woodland Vole. For at least the first two species there apparently is a modest, breeding population. One resident (Banticks 1988) reported a single sighting of what was interpreted to be a Gray Fox; however, the status of a population of this nationally, provincially and regionally rare species within the area has not been confirmed, and its record remains hypothetical.

B. SIGNIFICANT AREAS

1. INTRODUCTION

9 significant areas[1] are identified within the Oriskany Sandstone and Woodlands Life Science ANSI, and 1 is identified in its immediate vicinity, but outside its boundary. These areas incorporate those significant earth science, vegetational, floral and faunal features occurring within the ANSI which contribute to the life science representation within the province. Furthermore, each area attempts to contain those features which portray a major life and earth science theme. However, the recognition of these areas should not detract from the value of the other portios of the ANSI, for while their features may not be as mature, as well-developed, as species rich or as pristine, they complete the complement of the ANSI's features, and provide a buffer and uniting corridor, and given time, will themselves develop into notable features. The significant areas are treated on 2 levels of significance: provincial and regional. They are briefly described and discussed below, and are mapped in Figure 9 and Map 3.

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1. Prior permission to enter these areas must be obtained from the owners, particularly for Significant Areas A, F, G, I and J, which are managed by Nelson Aggregates (B. Vanderburg).

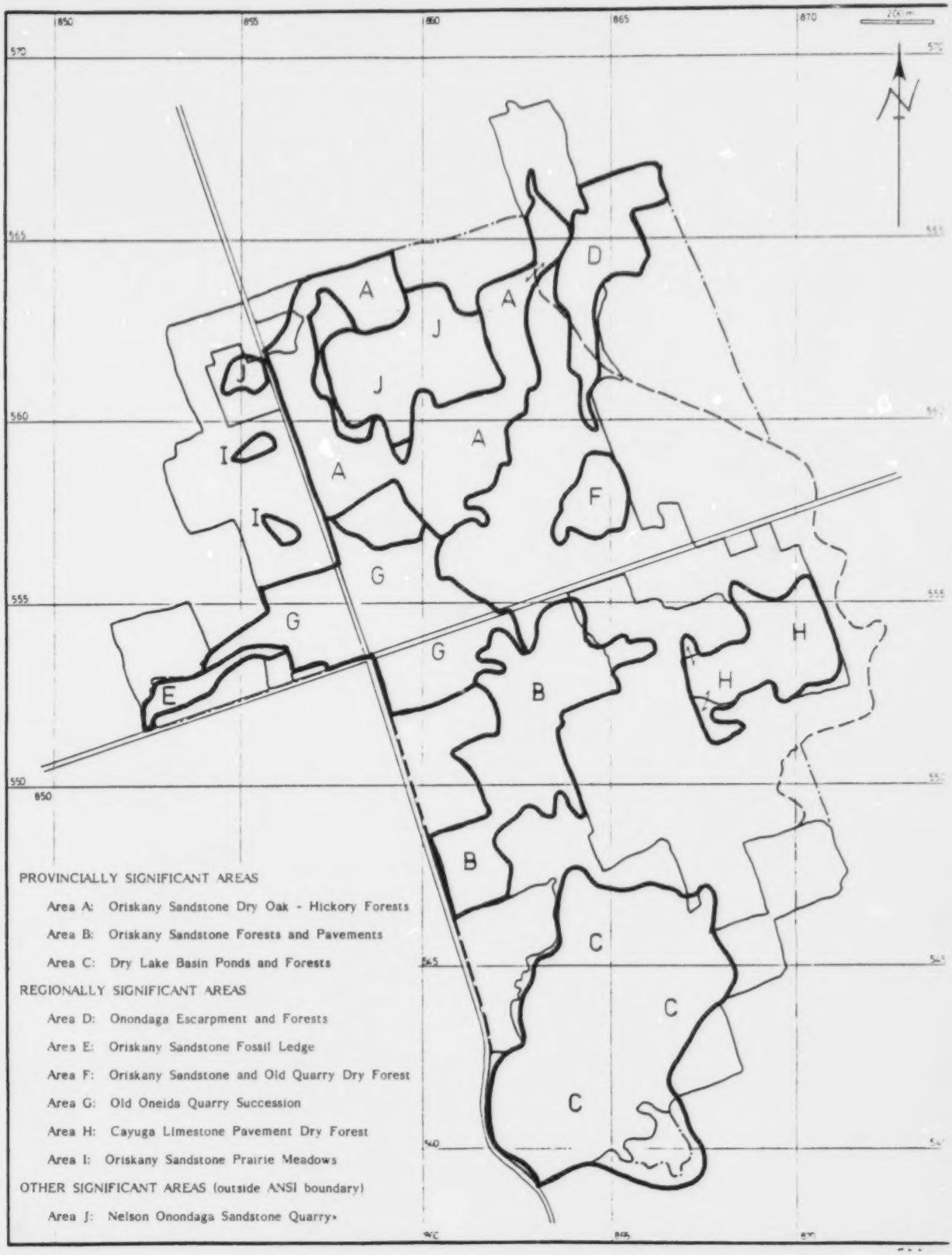
PROVINCIALLY SIGNIFICANT AREAS
Area A: Oriskany Sandstone Dry Oak - Hickory Forests
Area B: Oriskany Sandstone Forests and Pavements
Area C: Dry Lake Basin Ponds and Forests
REGIONALLY SIGNIFICANT AREAS
Area D: Onondaga Escarpment and Forests
Area E: Oriskany Sandstone Fossil Ledge
Area F: Oriskany Sandstone and Old Quarry Dry Forest
Area G: Old Oneida Quarry Succession
Area H: Cayuga Limestone Pavement Dry Forest
Area I: Oriskany Sandstone Prairie Meadows
OTHER SIGNIFICANT AREAS (outside ANSI boundary)
Area J: Nelson Onondaga Sandstone Quarry

Figure 9: Significant Natural Areas of the Oriskany Sandstone and Woodlands Area of Natural and Scientific Interest

2. PROVINCIALLY SIGNIFICANT AREAS

These areas concentrate on those life and earth science features which are intimately associated with the presence of the Oriskany sandstone bedrock. Notable features of paramount importance here are the following: exposures of sandstone pavement; karst, or other collapse or shelf features; groundwater hydrology controlled environments; dry oak - hickory forests; and concentrations of nationally, provincially and regionally significant plant and animal species. These areas generally have a relatively high diversity of features, and a low level of land use disturbances. 3 such areas are identified within the ANSI, and are discussed below:

Area A: Oriskany Sandstone Dry Oak - Hickory Forests

This area is located in the northcentral portion of the ANSI, essentially surrounding the recent quarry development on three sides (UTMs 858568 to 856560 to 860557 to 863566), and has a surface area of 30.9 ha (10% of the ANSI's total). The extensive, well developed forest communities and significant species concentrations are of great importance here. The provincially and regionally significant features here include the following:

- The most extensive, contiguous dry oak forest complex in the ANSI with low disturbance levels (F-1, F-2, F-3, F-4, F-5)
- Sandstone bedrock near the surface with local collapse features and low escarpments
- The largest oak openings in the ANSI with concentrations of nationally, provincially and regionally significant flora
- Excellent potential natural habitat for Black Rat Snake populations and other fauna
- 4 nationally and provincially rare plant species: yellow mandarin (**Disporum lanuginosum**), prostrate tick-trefoil (**Desmodium rotundifolium**), hairy bedstraw (**Galium pilosum**) and early blue wood violet (**Viola palmata** var. **palmata**)
- 12 regionally significant native plant species: sicklepod (**Arabis canadensis**), smooth small pussytoes (**Antennaria neodioica** subsp. **canadensis**), squawroot (**Conopholis americana**), long-bracted tick-trefoil (**Desmodium cuspidatum**), panicled tick-trefoil (**D. paniculatum** var. **paniculatum**), stickseed (**Hackelia deflexa** var. **americana**), hairy beard-tongue (**Penstemon hirsutus**), common polypody (**Polypodium virginianum**), Chinquapin oak (**Quercus muehlenbergii**), bristly buttercup (**Ranunculus hispidus** var. **hispidus**?), Pennsylvania raspberry (**Rubus pensilvanicus**) and hybrid goldenrod (**Solidago canadensis** X **S. juncea**).

This area is close to the Dry Lake Road and the Nelson Quarry site. There is very good display of the significant natural features. Local ongoing light cutting and grazing have slighlty effected the quality of the features. The area is adjacent to Significant Areas D, G, I and J.

Area B: Oriskany Sandstone Forests and Pavements

This area is located in the northern section of the southern arm of the ANSI (UTMs 861546 to 866554), and has a surface area of 24.22 ha (8% of the ANSI's total). The Oriskany sandstone pavement forests, barrens and landforms are significant here. The presence of a known denning site for the Black Rat Snake is of prime interest here. The provincially and regionally significant features here

include the following:

- o A large, contiguous complex of upland dry and circummesic forests (F-1, F-4, F-11) with an oak opening (F-0)
- o Extensive sandstone pavement with open vegetation (S-o, S-m, S-t)
- o The best development of secondary collapse features in the ANSI
- o The most mature dry oak - hickory forest (F-1) in the ANSI
- o Reported to be known denning site and possible hibernaculum for Black Rat Snake population (Vanderburg 1988)
- o It includes 1 of the clay knoll features
- o 5 nationally and provincially rare plant species: yellow mandarin (**Disporum lanuginosum**), hawthorn (**Crataegus dodgei**), hairy pinweed (**Lechea villosa**), early blue wood violet (**Viola palmata** var. **palmata**) and hairy bedstraw (**Galium pilosum**)
- o 7 regionally significant native plant species: dwarf Juneberry (**Amelanchier sanguinea**), squawroot (**Conopholis americana**), common hair grass (**Deschampsia flexuosa**), panicled tick-trefoil (**Desmodium paniculatum** var. **paniculatum**), Bicknell's cranesbill (**Geranium bicknellii**), Pennsylvania raspberry (**Rubus pensilvanicus**) and early saxifrage (**Saxifraga virginiensis**).

The area is close to both Dry Lake and Town Line Roads. It has general light disturbances from cutting in the forests, but severe grazing in the open pavement sections. The northeastern section of this area is under agricultural use as pasture, and extends slightly beyond the ANSI's Life Science boundary.

Area C: Dry Lake Basin Ponds and Forests

This area is located in the southernmost portion of the ANSI, encompassing the wetlands and swamp forests of the Dry Lake Basin (UTMs 863538 to 866547), and has a surface area of 45.32 ha (15% of the ANSI's total). The karst basin, pond shore communities and concentration of a nationally and provincially rare plant are of prime interest here. The provincially and regionally significant features here include the following:

- o The best developed example of karst collapse features in the region
- o Excellent display of effect of groundwater fluctuations on environment and vegetation
- o Good wetland and shoreline habitat for migratory birds
- o Diverse, representative lowland and wetland communities (L-2, L-b, L-g, L-3, W-w, W-m, W-t, W-a, W-g, W-e)
- o Presence of 3 slough depression features with characterizing thicket and fringe grove vegetation (L-b, L-g)
- o Significant swamp forest concentration of swamp white oak (**Quercus bicolor**)
- o 11 of the clay knoll features occur here
- o Seasonally fluctuating water level is critical habitat for 1 nationally and provincially rare plant: many-fruited false loosestrife (**Ludwigia polycarpa**)
- o 3 nationally and provincially significant plant species: yellow mandarin (**Disporum lanuginosum**), many-fruited false loosestrife (**Ludwigia polycarpa**) and southern arrowwood (**Virburnum recognitum**)
- o 3 regionally significant native plant species: sedge (**Carex projecta**), Pennsylvania raspberry (**Rubus pensilvanicus**) and water pimpernel (**Samolus parviflorus**)
- o 1 regionally new plant species: dwarf spurge (**Euphorbia exigua***).

The area has excellent viewing from Dry Lake Road. The installation of a water control dam for waterfowl management purposes may compromise the population of nationally and provincially rare plants and the groundwater pulse controlled environment. There is light to moderate cutting in the lowland forests.

3. REGIONALLY SIGNIFICANT AREAS

Regionally significant areas also provide excellent representation of the major life and earth science features which characterize the ANSI. These include the upland dry and circummesic forests, lowland forests and thickets, upland meadows with concentrations of prairie species, sandstone pavement features and post-quarry development succession phenomena. In these cases, the influence of land use impacts may be more evident in the features. 6 regionally significant areas are identified, and are discussed below:

Area D: Onondaga Escarpment and Forests

This area is located in the northeastern portion of the ANSI along the length of the Onondaga Escarpment (UTMs 864560 to 866566), and has a surface area of 10.3 ha (3.4% of the ANSI's total). The communities which occur at the base of the escarpment are representative of the Haldimand Clay Plain. The provincially and regionally significant features here include the following:

- Well-developed slope and basin features of the Onondaga Escarpment
- Presence of 3 slough depression features with characterizing thicket and fringe grove vegetation (L-b, L-g)
- Well-developed, submature circummesic forests (F-9, F-12), and includes dry forest (F-1) atop escarpment
- 3 nationally and provincially rare species: sedge (**Carex gracilescens**), yellow mandarin (**Disporum lanuginosum**) and American columbo (**Frasera caroliniensis**)
- 5 regionally significant native species: sedge (**Carex projecta**), three-way sedge (**Dulichium arundinaceum**), soft rush (**Juncus effusus** var. **solutus**), lowland Virginia creeper (**Parthenocissus quinquefolia**) and American burreed (**Sparganium americanum**).

There has been general light to moderate cutting in the forests. There is some drainage from the sloughs along an agricultural ditch. Plantations are adjacent on the area's eastern side. The area is adjacent to Significant Area A.

Area E: Oriskany Sandstone Fossil Ledge

This small area is located at the westcentral edge of the ANSI, to the north of Town Line Road (UTMs 852552 to 856553), and has a surface area of 2.06 ha (0.6% of the ANSI's total). The fossil-rich escarpment face here is of prime interest. The provincially and regionally significant features here include the following:

- Notably fossil-rich low escarpment of sandstone with collapse features
- 1 nationally and provincially rare plant species: yellow mandarin (**Disporum lanuginosum**)
- 2 regionally significant native plant species: beggar's-lice (**Hackelia virginiana**) and common polypody (**Polypodium virginianum**)

The forest cover here has been thinned and brushed; however, this creates an open view of the low escarpment and its features. The area is adjacent to Significant Area G.

Area F: Oriskany Sandstone and Old Quarry Dry Forest

This area is located in the eastcentral portion of the ANSI to the north of Town Line Road (UTM 864557), and has a surface area of 4.12 ha (1.3% of the ANSI's total). The provincially and regionally significant features include the following:

- o Oriskany sandstone pavement with a good example of the upland dry forest (F-1) and oak opening (F-0)
- o Old quarry works with quarry face and refuse pile successional forest and community patterns
- o Good potential for Black Rat Snake denning habitat
- o 2 nationally and provincially rare plant species: American sweet chestnut (**Castanea dentata**) and hairy bedstraw (**Galium pilosum**)
- o 2 regionally significant native plant species: Pennsylvania raspberry (**Rubus pensilvanicus**) and panicled tick-trefoil (**Desmodium paniculatum** var. **paniculatum**).

The forest has encountered light to moderate cutting. The old quarry development is of site rehabilitation interest, and presents a working face and refuse tip pile. It is separated from Significant Areas A and D by recently cut forest.

Area G: Old Oneida Quarry Succession

This area is located about the intersection of Dry Lake and Town Line Roads, and has a surface area of 24.72 ha (8% of the ANSI's total). It is main features demonstrate those successional communities following quarry activity. The provincially and regionally significant features here include the following:

- o Diverse spectrum of well developed post-quarry development successional vegetation (Q-f, Q-x, Q-t, Q-d)
- o Well-developed sandstone pavement barrens, meadow and thicket vegetation (S-o, S-m, S-t)
- o Small oak opening (F-0) developed on sandstone bedrock
- o Diverse examples of past quarry associated landforms, including quarry faces, quarry pits, refuse tip piles and glass-works factory foundations
- o Quarry pit (UTM 857554) is roosting and hibernaculum sites for several bat species: Little Brown Bat, Northern Long-eared Bat, Big Brown Bat and possibly Hoary Bat
- o Quarries and foundations of glass works and barn have potential for being denning and hibernation sites for Black Rat Snake
- o 2 nationally and provincially rare plant species: early blue wood violet (**Viola pedata** var. **pedata**) and hairy bedstraw (**Galium pilosum**)
- o 12 regionally significant native plant species: dwarf Juneberry (**Amelanchier sanguinea**), common hair grass (**Deschampsia flexuosa**), long-bracted tick-trefoil (**Desmodium cuspidatum**), Bicknell's cranesbill (**Geranium bicknellii**), beggar's-lice (**Hackelia virginiana**), prairie cinquefoil (**Potentilla arguta**), Chinquapin oak (**Quercus muehlenbergii**), Pennsylvania raspberry (**Rubus pensilvanicus**), hybrid sumac (**Rhus** X **borealis**), smooth sumac (**R. glabra**), early saxifrage (**Saxifraga virginiensis**), live-forever (**Sedum telephium***) and Venus' looking

glass.

There is considerable disturbance in this area; however, the interest in its features lies in the successional vegetation patterns which have become established on these old quarry workings. There is excellent viewing from Dry Lake and Town Line Roads.

Area H: Cayuga Limestone Pavement Dry Forest

This area is located in the eastcentral edge of the ANSI, south of Town Line Road (UTM 867551 to 8715556), and has a surface area of 1.3 ha (3.4% of the ANSI's total). The potential for the young dry forest to develop into a significant feature is important here. As well, the features associated with limestone bedrock substrate provide an opportunity for comparison with those sandstone features. The provincially and regionally significant features here include the following:

- o Limestone pavement with young dry forest (F-6) that has potential for maturing into an interesting vegetation feature
- o Limestone and sandstone pavement with low escarpment landform
- o Bedrock pavement open meadow vegetation (S-o, S-m)
- o Potential for research on impacts of quarry dust on plant growth
- o 5 regionally significant native plant species: butterfly weed (**Asclepias tuberosa**), Bicknell's cranesbill (**Geranium bicknellii**), Chinquapin oak (**Quercus muehlenbergii**), smooth sumac (**Rhus glabra**) and Pennsylvania raspberry (**Rubus pensilvanicus**).

This area has suffered severe cutting in the past, but is developing an interesting vegetation. The adjacent Cayuga Quarry development may have an impact on the general plant growth, through dust percipitation and creating a drier environment through site preparation. Pasture activity is locally intensive in the open pavement sites.

Area I: Oriskany Sandstone Prairie Meadows

This area is located in the northwestern portion of the ANSI as three small sections along the western side of Dry Lake Road (UTMs 855560, 855559, 856557), and has a surface area of 2.06 ha (0.6% of the ANSI's total). The provincially and regionally significant features here include the following:

- o Exposures of shallowly soiled sandstone pavement
- o Small successional meadow vegetation with concentrations of prairie plants: round-headed bush-clover (**Lespedeza capitata**), wand-like bush-clover (**L. intermedia**) and Dillen's tick-trefoil (**Desmodium paniculatum var. dillenii**, all of which are rare in Central Region)
- o 1 regionally significant native plant species: panicled tick-trefoil (**Desmodium paniculatum** var. **paniculatum**).

The portions of this area have excellent access from Dry Lake Road. These features have experienced agricultural disturbances in the past, and possibly quarry development disturbances as well. The prairie species may be invading the adjacent successional meadow and thicket vegetation.

4. OTHER SIGNIFICANT AREAS

One area which is located outside the boundaries of both the Life Science or Earth Science ANSIs has potential for being a significant area. This area would provide access mostly to earth science features, notably the bedrock strata of the Oriskany Formation, which are not represented within the present ANSI boundary.

Area J: Nelson Onondaga Sandstone Quarry

This area is located to the northwest of the ANSI, and could include with one or both of the present quarry pits (UTMs 855561 and 8605551). These would increase the surface area of the ANSI by 12.3 ha (4% of the ANSI's present total). The area presents opportunity to study succession on sandstone and limestone substrates, and to contribute to site rehabilitation techniques. The provincially and regionally significant features here include the following:

- Excellent display of relationship of Oriskany Sandstone Formation to the overlying and underlying limestone strata
- The eastern quarry presently is a roosting site for large population of Turkey Vulture (36 individuals, mature and juvenile in 1988)
- 3 regionally significant native plant species: beggar's-lice (**Hackelia virginiana**), smooth sumac (**Rhus glabra**) and Pennsylvania raspberry (**Rubus pensylvanicus**).

C. MANAGEMENT CONSIDERATIONS

The following recommendations should be considered by ministry staff for the management of the natural features within the ANSI:

1. Cooperation with land-owners and encouragement of private stewardship:
An appreciation of the significance of the earth and life science features within the ANSI by the residents of the area should be encouraged. In particular, the values of the dry forest communities, plants species and the Black Rat Snake population should be appropriately interpreted to them. They also should be encouraged to participate in the protection of 'their ANSI' through sharing their long term observations and continued monitoring of the features. Encouragement from the Carolinian Canada organization, and the application of other appropriate inducements should be considered. Researchers who undertake studies within the ANSI and its vicinity must appreciate the value of the goodwill from the land-owners. It is painfully apparent that the considerable badwill which was created a decade ago between land-owners and researchers was detrimental to the protection of the area's significant features. The necessity and benefits of obtaining their permission prior to entering the area, and of holding informal, informative conversations with them to develop and maintain goodwill can only aid in achieving the goal of protecting the area's significant features.

2. Cutting and grazing within ANSI:
The continuing practice of cutting and grazing within the forest communities, and grazing and vehicle use within the areas of sandstone exposures, compromises the quality of their community structures. Several sections of the significant areas have been recently marked for timber management purposes. As well, a portion of the area set aside in 1978 by the Ontario Municipal Board as an Environmental

Protection Area was at least occasionally being pastured in 1988, an activity directly contravening the direction given by the Ontario Municipal Board. These activities are probably incompatible with the intended goals of the ANSI program. If possible, alternative venues for these activities should be sought.

3. Study of the Black Rat Snake population:
The Black Rat Snake is nationally, provincially and regionally rare and threatened. Its occurrence within the ANSI and its vicinity is of great significance for its representation of provincial Life Science features. However, little concrete information is available for determining the management requirements of the ANSI's population of this species, or whether the ANSI's features are even adequate for maintaining a viable population. A comprehensive investigation of the Black Rat Snake population within the ANSI and its general vicinity should be undertaken by qualified researchers. Such research should determine the population number, breeding success, cover and forage habitat requirements, and the location of denning and hibernacula sites. The cooperation of residents should be obtained, particularly in identifying well established denning and hibernation sites, and in participating in the protection of the species.

4. Impact of waterfowl management on Dry Lake Basin:
There should be an examination of the impact of the Ducks Unlimited dam in the Dry Lake Basin upon the critical habitat for the nationally and provincially rare plant: many-fruited false loosestrife (**Ludwigia polycarpa**), and its effects on the environment of the adjacent lowland forests to the north. The population of this plant is directly related to the continuation of the seasonal drawdown of the pond level. The maintenance of the water level for the benefit of waterfowl management may compromise this rare species. Furthermore, the considerable spring flooding which this swamp usually experiences may be lessened by the dam's action. The actual impacts of this dam should be determined, and if deleterious to the plant population, its presence should be reevaluated in favour of the significant species.

5. Monitoring of significant species:
There should be a periodic monitoring of the populations of nationally, provincially and regionally significant plant and animal populations within the ANSI. This should include mapping distributions, recording population sizes and noting changes. Several populations in the ANSI require immediate study in order to be properly managed. The population of many-fruited false loosestrife (**Ludwigia polycarpa**), which occurs around the pond shore of Dry Lake, and which is critically associated with the seasonal drawdown of the water level, may be compromised by the waterfowl management activities there. The southern arrowwood (**Viburnum recognitum**), which occurs in the swamp forest to the north of the ponds, may be shaded out by closure in the tree canopy, or by modification to the water level in the swamp. The population of the American columbo (**Frasera caroliniensis**) in Significant Area D should be accurately located and monitored to determine its size and condition. The population of Virginia yellow flax (**Linum virginianum**) which was reported from the former prairie was eradicated with the development of the recent quarry facilities; the existance of any populations elsewhere within the ANSI or its vicinity would be significant.

6. Confirmation and expansion of data base: The present report is only a general inventory of the main natural life science features of the ANSI, and is by no means complete. The plant and animal lists probably include about 95% of the

flora and fauna, and the vegetation descriptions are only generalizations, and lack quantitive analysis. Further inventory studies should be conducted to confirm and expand upon this presently available data base. There should be encouragement to and cooperation with academic and other qualified researchers to complete our understanding and appreciation of the area's ecology and significance. Vegetation studies could be undertaken to identify the response to the sandstone environment and to changes in this environment. The use of point quarter or other suitable sampling techniques would be compatible with the goals of the ministry's ANSI program. The accurate location of several significant species could not be established during the present study. Future searches should relocate the stations at least for the nationally and provincially rare species: sedge (**Carex gracilescens**), hawthorn (**Crataegus dodgei**), Virginia yellow flax (**Linum virginianum**), early blue wood violet (**Viola palmata** var. **palmata**) and American Columbo (**Frasera caroliniensis**). Additionally, population information on these and the other significant species populations is required for appropriate evaluation of management requirements within the ANSI. Similarly for the area's fauna, the occurrence and residency status of Hoary Bat, Gray Fox and the other hypothetical species should be determined.

7. Groundwater in the Dry Lake Basin and vicinity:
Earth science studies should investigate the role of groundwater in the development of the collapse features of Significant Area B and in the contribution to the water regime of the Dry Lake Basin of Significant Area C. This bears directly on the viability of the wetland communities of the Dry Lake Basin, particularly with respect to the damming of Dry Lake.

8. Origins of low escarpment of Significant Area A:
The origins of this low escarpment (UTM 858558) should be established. Fraser (1988) has suggested that it may be a quarry face rather than a natural escarpment. If it is a recent quarry feature, then this reflects upon the reported significance of the associated dry oak - hickory forest cover (Fahselt et al. 1979). It would be of sobering interest to learn that the species complement for the associated forest here were still to have such a "considerable diversity" of plant species, many of them significant, if the stand were in effect a successional community.

9. Mapping of Oriskany Sandstone Formation:
Mapping of the Earth Science features within the ANSI should concentrate on a more exact delimitation of the occurrence of the Oriskany Sandstone Formation, noting the extent of actual surface exposures, the unconsolidated material covered exposures, and overlying limestone formation occurrences. Such accurate mapping would assist in establishing the extent of relationships between the vegetation, biota and substrate.

10. Impacts of quarry development activities:
The past and continuing quarry development activities in the vicinity of the ANSI has had an impact upon the quality and types of its natural features. The area presents an excellent opportunity for determining such effects. The forest cover of Significant Area H is subjected to dust percipitation from the adjacent Cayuga Quarry. The extensive complement of successional features on the old and recent quarry sites within the ANSI provide potential for the study of site rehabilitation techniques which would benefit the quality of the remaining natural features here.

11. Interpretation of Oriskany Sandstone Formation strata:
One aspect lacking in the earth science representation of the ANSI is a physical cross-section of the relationship of the Oriskany Sandstone Formation to the overlying and underlying limestone strata. The use of the present Nelson Quarry pits in interpreting these features would greatly benefit the purpose of the ANSI. The ministry should seek permission from and cooperation of the Nelson Aggregates owners in allowing ANSI visitors and researchers to enter the Significant Area J, surrounding their recent quarry pits.

12. Determination of visitor impacts on ANSI:
Those communities within the area which are most sensitive to trampling impacts are the sandstone barrens and meadows (S-o, S-m) and escarpment (S-e, F-12), the Dry Lake pond shoreline (W-w) and the oak openings (F-0). The levels of incompatible use by visitors and the presence of ATVs and their impacts should be monitored.

13. Boundary modifications for Life Science ANSI:
The extensive sandstone pavements which have been bared through the recent quarry operations are of earth science significance and life science interest. The ministry should investigate the benefits and means of including the Significant Areas J and the northern part of Significant Area I within the ANSI's boundaries. The current southern portion of the Life Science ANSI (about UTM 861539) fails to include a wetland, on the west side of Dry lake Road, which extends to the southwest of Dry Lake Basin. Its life and earth science features should be examined and evaluated, and if suitable, the ANSI boundaries should be extended to include it. As well, the current northeastern portion of the Life Science ANSI (about UTM 867562) includes actively managed 'Christmas tree' and conifer plantations. As the features within this portion of the ANSI do not appear to present a representation of notable life science features, its retention within the ANSI should be reevaluated by the ministry, taking into consideration any earth science features which it may include.

GLOSSARY

community structure: This is a measure of the response of the flora of a community to the environment, as indicated by the closure characteristics of the tree, shrub, herb and lower strata, the importance of the component species in each stratum and the interrelationships between the members of the flora and fauna.

endangered species: A taxonomic category of plant or animal whose existence, in the region under consideration, is threatened with immediate elimination through all or a significant portion or the region owing to the actions of man.

extirpated species: A taxonomic category of plant or animal which no longer exists in the wild in the region under consideration, but does exists elsewhere.

forb: A plant which has a broad-leaved herbaceous plant form.

graminoid: A plant which has a narrow-leaved herbaceous plant form.

rare species: A taxonomic category of plant or animal that because of its biological characteristics, or because it occurs at the edge of its range, or, for some other reason, exists in low numbers or in very restricted areas in the region under consideration; this rarity is measured at 3 levels in this report: nationally (within Canada), Provincially (within Ontario; Argus et al. 1987), and regionally (within Haldimand.-.Norfolk; Gartshore et al. 1987 a, 1987 b).

threatened species: A taxonomic category of plant or animal that is likely to become endangered, in the region under consideration, unless the factors affecting it vulnerability do not become reversed.

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AERIAL PHOTOS

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APPENDIX A: VASCULAR PLANT FLORA OF THE ORISKANY SANDSTONE AND WOODLANDS AREA OF NATURAL AND SCIENTIFIC INTEREST

The following species list includes the following annotations:

FORMAT

[ ]	alternative scientific name
( )	alternative common name
*	introduced, adventive, naturalized and persistant
**	also cultivated or in plantation

STATUS

Nr	Nationally Rare
Pr	Provincially Rare (in Ontario)
Px	Provincially Delisted (formerly on Provincial rare list)
Rr	Regionally Rare (1 to 5 stations in Haldimand-Norfolk)
Rvuc	Regionally Very Uncommon (6 to 8 stations)
Ruc	Regionally Uncommon (9 to 15 stations)
Rc	Regionally Common (over 16 stations)
*	Regionally Significant Non-native Species
**	(indicates recent revision of regional significance)

SOURCES
(herbaria housing collections indicated in parentheses)

A	J.K. Alex 1977 (OAC)
AIS	Allan, Irwin & Small, et al. 1977
B	J.W. Ball: 6 June 1977, 9 Sept. 1977 (TRTE PWB)
Br	D. Bradley: 15 Apr. 1985, 19 May 1985 (TRTE)
By	T.J. Beechey 1977
D	G. de Boer et al. 1982 (WAT)
E	Ecological Services for Planning 1977 (OAC)
F	D. Fahselt et al. 1979 (UWO)
G	M.J. Gartshore: 1 May 1985, 29 Aug. 1985, 16 Sept. 1986 (TRTE)
GSM	Gartshore, Sutherland & McCracken 1987
K	J. Kaiser 1986 (TRTE)
L	L.E. Lamb: July 1979 (WAT LEL)
M1	I.D. Macdonald: 19 Sept. 1976 (TRTE)
M2	I.D. Macdonald: 7 - 22 Aug. 1988 (TRTE WAT UWO CAN)
MRG	Maycock, Reznicek & Gregory 1977 (TRTE)
My	P.F. Maycock: 1976, 1977 (PFM TRTE)
O1	M.J. Oldham: 29 April 1979 (TRTE)
O2	M.J. Oldham: 17 July 1988 (TRTE MICH)
P	J.B. Phipps: May 1980 (UWO)
R	A.A. Reznicek: 8 May 1977 (TRTE MICH)
S	D.A. Sutherland: 15 Apr. 1985, 18 Sept. 1986, 22 Sept. 1986 (TRTE)

VEGETATION COMMUNITIES
(codes follow those of vegetation discussion)

S	Sandstone Pavement Communities
Q	Quarry Communities
A	Anthropogenic Communities
X	Successional Communities
P	Plantation Communities
PP	Prairie Community
F	Upland Forest Communities
L	Lowland Communities
W	Wetland Basin Communities

APPENDIX A: VASCULAR PLANT FLORA OF THE ORISKANY SANDSTONE AND WOODLANDS AREA OF NATURAL AND SCIENTIFIC INTEREST

— FERNS and FERN ALLIES —

LYCOPODIACEAE - CLUBMOSS FAMILY

Lycopodium clavatum L. running clubmoss	Ruc	My (D MRG F GSM)	F-1?

EQUISETACEAE - HORSETAIL FAMILY

Equisetum arvense L. field horsetail	Rc	M12 (D By)	A-4 F-6

OPHIOGLOSSACEAE - ADDER'S-TONGUE FAMILY

Botrychium dissectum Sprengel var. **dissectum** dissected grapefern	Rc	S	—
B. virginianum (L.) Swartz rattlesnake fern	Rc	D E K M12 (By)	F-2 8 11 12 13

ADIANTACEAE - MAIDENHAIR FAMILY

Adiantum pedatum L. northern maidenhair fern	Rc	E My (D)	--

POLYPODIACEAE - POLYPODY FERN FAMILY

Polypodium virginianum L. [**P. vulgare** L. var. **virginianum** (L.) A.A. Eaton] common polypody	Rr	Br D M2	F-2 12

DENNSTAEDTIACEAE - HAY-SCENTED FERN FAMILY

Pteridium aquilinum (L.) Kuhn var. **latiusculum** (Desvaux) Underwood eastern bracken fern	Rc	D K M12 My E (MRG F)	S-m Q-gf X-stg P-x F-0 1 3 4 5 6 8 9 11

THELYPTERIDACEAE - BEECH FERN FAMILY

Thelypteris noveboracensis (L.) Nieuwland [**Dryopteris noveboracensis** (L.) A. Gray] New York fern	Rc	R (My)	Q-f
T. palustris (Salisbury) Schott var. **pubescens** (Lawson) Fernald [**Dryopteris thelypteris** (L.) A. Gray var. **pubescens** (Lawson) Nakai] marsh fern	Rc	M2 R E (My D)	F-11 L-g2mt

ASPLENIACEAE - SPLEENWORT FAMILY

Asplenium platyneuron (L.) Oakes ex D.C. Eaton ebony spleenwort	**PxRuc**	My D M2 S (F)	Q-xf F-0 1? 4
Athyrium filix-femina (L.) Rothwell var. **michauxii** (Sprengel) Farwell [**A. angustum** (Willd.) Presl] northeastern lady fern	Rc	D E M2	F-0 3 5 6 9
A. thelypteroides (Michaux) Desvaux silvery glade fern	Ruc	E (D)	--
Cystopteris bulbifera (L.) Bernhardi bulblet fern	Rc	M2	S-e Q-f
C. tenuis (Michaux) Desvaux [**C. fragilis** (L.) Bernhardi var. **mackayi** Lawson] Mackay's fragile fern	Rc	D S M2 E M1	S-e Q-f F-1 11 12
Dryopteris carthusiana (Villars) H.P. Fuchs [**D. spinulosa** (O.F. Mueller) Watt] spinulose woodfern	Rc	S E M12 (By D)	Q-f Lg4 F-1 5 6 9 11 12
D. cristata (L.) A. Gray crested woodfern	**Rvuc**	M2	F-6
D. intermedia (Muhl.) A. Gray [**D. spinulosa** (O.F. Mueller) Watt var. **intermedia** (Willd.) Underwood] glandular woodfern	Rc	M2	F-11
D. marginalis (L.) A. Gray marginal woodfern	Rc	D E M12	S-e F-1 12
Onoclea sensibilis L. sensitive fern	Rc	D M12 (By)	L-1g24b

GYMNOSPERMS

PINACEAE - PINE FAMILY

Larix laricina (Du Roi) K. Koch •• tamarack	Rc	M2	P-p
Picea abies (L.) Karsten • •• Norway spruce	Rc	M2	P-p
P. glauca (Moench) A. Voss •• white spruce	Rc	My M2	P-p
Pinus banksiana Lamarck •• jack pine	Rc	D My K M2	P-p
P. resinosa Aiton •• red pine	Rc	My D M2	Q-g P-p F-3
P. strobus L. eastern white pine	Rc	D My E K M12 (By F MRG)	S-t Q-gf A-i P-pdx F-0 1 2 3 4 5 6 7 L-l F-9 10 11 12 X-pitgfh
P. sylvestris L. • •• Scotch pine	Rc	My M2	Q-g X-ml P-p F-6

CUPRESSACEAE - CYPRESS FAMILY

Juniperus communis L. var. **depressa** Pursh	common juniper	Ruc	M2	X-s
J. virginiana L.	eastern red cedar	Rc	D My E M12 (By F)	S-o Q-xtgf X-f F-0 1 4 6 11
Thuja occidentalis L.	eastern white cedar	Rc	My D M2	Q-f F-12

— MONOCOTYLEDONS —

TYPHACEAE - CATTAIL FAMILY

Typha angustifolia L.	narrow-leaved cattail	Rc	M2	W-me
T. latifolia L.	broad-leaved cattail	Rc	M12	W-e

SPARGANACEAE - BURREED FAMILY

Sparganium americanum Nuttall	American burreed	**Rvuc**	M2	L-m
S. chlorocarpum Rydberg	green-fruited burreed	**Rvuc**	M2	W-m
S. eurycarpum Engelmann	great burreed	Rc	M12	W-fme

POTAMOGETONACEAE [ZOSTERACEAE] - PONDWEED FAMILY

Potmogeton natans L.	floating pondweed	Rc	M2	W-a
P. pusillus L. var. **pusillus**	small pondweed	Rc	M2	W-a

ALISMATACEAE - WATER PLANTAIN FAMILY

Alisma plantago-aquatica L.	water plantain	Rc	M2	L-b W-we
Sagittaria latifolia Willd.	broad-leaved arrowhead	Rc	D M2	W-me

POACEAE [GRAMINEAE] - GRASS FAMILY

Agropyron repens (L.) Beauvais •	quack grass, couch grass	Rc	My M12 (By D)	S-m A-r

Agrostis gigantea Rothwell • [**A. alba** auct. Amer., non L.] redtop	Rc	My M12 (By D)	A-r X-c W-xt	
A. perennans (Walter) Tuckerman autumn bent grass	Ruc	M2 M1 (By D)	W-g	
A. scabra Willd. [**A. hyemalis** (Walter) BSP. var. **tenuis** (Tuckerman) Gleason] tickle grass	Ruc	M1 (By D)	W-m	
A. stolonifera L. [**A. alba** L. var. **palustris** (Hudson) Persoon] creeping bent grass	Ruc	M2	F-12	
Andropogon gerardii Vitman big bluestem, turkeyfoot	Rc	My (By F D GSM)	PP	
Brachyelytrum erectum (Schreber) Beauvais bearded shorthusk	Rc	M2	F-12	
Bromus commutatus Schrader • hairy chess	Rc	M2	A-r	
B. inermis Leysser • smooth brome grass	Rc	My E M12 (D)	Q-ox A-rf X-ms P-p	
B. kalmii A. Gray Kalm's brome grass	Rr	D (S)	Q-o?	
B. mollis L. • soft chess	PxRr	B	F-2?	
B. pubescens Muhl. ex Willd. Canada brome grass	PxRuc	M2	F-11	
B. tectorum L. • downy chess	Rc	K	--	
Calamagrostis canadensis (Michaux) Beauvais Canada bluejoint	Rc	M1	W-mt	
Dactylis glomerata L. • orchard grass	Rc	M12 (By D)	S-oem Q-o A-rpf P-px X-stfc F-11	
Danthonia spicata (L.) Beauvais poverty oat grass	Rc	D My E M12 (F By GSM)	S-emt Q-o A-r X-sh F-0 1 4 6	
Deschampsia flexuosa (L.) Trinius common hair grass	Rr	D M2 My (MRG F S GSM)	S-oe F-0 4 5	
Dichanthelium acuminatum (Swartz) Gould & Clark var. **implicatum** (Scribner) Gould & Clark [**Panicum lanuginosum** Elliott] hairy panic grass	Rc	M2	S-o Q-f F-0 4 11	
D. latifolium (L.) Harvill [**Panicum latifolium** L. var. **latifolium**] broad-leaved panic grass	Rc	B M2 My K (F MRG)	PP F-0 1 11	
D. linearifolium (Scribner) Gould [**Panicum linearifolium** Scribner] narrow-leaved panic grass	Rc	B M2 My (F)	Q-o X-l PP F-0	

Digitaria ischaemum (Schreber) Schreber ex Muhl. * smooth crab grass	Ruc	M2	Q-o A-r X-s
D. sanguinalis (L.) Scopoli * large crab grass	Rc	M2	S-oem X-s
Echinochloa crusgalli (L.) Beauvais * [includes **E. microstachya** (Wiegand) Rydberg] barnyard grass	Rc	M2	W-w
Elymus hystrix L. [**Hystrix patula** Moench] bottle-brush grass	Rc	M12 (By D)	F-11 12 L-1
E. virginicus L. var. **virginicus** Virginia wild rye	Rc	M2	X-c
Eragrostis hypnoides (Lamarck) BSP. creeping love grass	PxRuc	M2	W-w
E. pectinacea (Michaux) Nees * tufted love grass	Rc	M2	S-oe A-r
Festuca obtusa Biehler nodding fescue	Rc	M2	F-6 11 12 13
F. pratensis Hudson * [**F. elatior** L.] meadow fescue	Rc	M2	S-0 Q-omf A-rpl X-sc
F. trachyphylla (Hackel) Krajina * [**F. longifolia** Thuiller] hard fescue	Ruc**	M2	S-m X-m
Glyceria grandis S. Watson tall manna grass	Ruc	M2	W-m
G. septentrionalis A.S. Hitchcock eastern manna grass	Ruc	B M2 M2 (By)	W-mw
G. striata (Lamarck) A.S. Hitchcock var. **striata** fowl manna grass	Rc	M12 (By)	X-c F-1 6 13 L-1g234tb
Leersia oryzoides (L.) Swartz rice cut grass	Rc	M2	A-w X-wd L-b W-fmte
L. virginica Willd. white grass	Rc	M2	L-12b
Lolium perenne L. var. **perenne** * perennial rye grass	Ruc	M2	A-1
Muhlenbergia frondosa (Poiret) Fernald forma **commutata** (Schribner) Fernald awned slender muhly grass	Rc	M2	Q-f A-w X-c F-11
M. mexicana (L.) Trinius Mexican muhly grass	Rc	M2	A-r
Oryzopsis asperifolia Michaux rough-leaved mountain rice	Rc	M12 (By D)	Q-f X-t F-1 3 4 5 6 11
O. racemosa (J.E. Smith) Ricker nodding mountain rice	Ruc	M2	F-5 6

Panicum capillare L. common witch grass	Rc	M12 (By D)	S-oe Q-o A-r X-ms W-w
P. dicotomiflorum Michaux fall panic grass	Rc	M2	A-rc
Phalaris arundinacea L. reed canary grass	Rc	M12	Q-w L-123 W-gfmwte X-d
Phleum pratense L. * Timothy grass	Rc	M12 (By D)	S-om Q-ogf A-rp X-stc
Phragmites australis (Cavanilles) Trinius ex Steudel common reed	Rc	M2	W-m
Poa alsodes A. Gray woodland Poa	Ruc	M2	F-0 1 4 6 7
P. annua L. * ** annual blue grass	Rc	M2	Q-o A-l X-sc
P. compressa L. * ** Canada blue grass	Rc	M12 K (By D)	S-oet Q-oxqtgf L-2 X-mstghc A-rpft F-0 1 4 11 12
P. palustris L. fowl meadow grass	Rc	M2	Q-m A-w W-m
P. pratensis L. * Kentucky blue grass	Rc	M2	S-omt Q-oxm A-rl X-mpsltfh P-pd F-0 1 2 6 12
Schizachne purpurascens (Torrey) Swallen var. **pubescens** Dore false melic grass	Rc	M12 K (By D)	Q-f F-4 6 12
Setaria glauca (L.) Beauvais * yellow foxtail	Rc	M12 (By D)	S-oemt Q-o A-xpc L-msc L-l
Sphenopholis intermedia (Rydberg) Rydberg slender wedge grass	Rc	M2	F-2
Sporobolus vaginiflorus (Torrey) A. Wood var. **inaequalis** Fernald ensheathed dropseed	Rc	M2	Q-q A-r X-s

CYPERACEAE - SEDGE FAMILY

Carex albursina Sheldon [**C. laxiflora** Lamarck var. **latiflora** Boott] sedge	Ruc	M2	F-1 11 12 L-1
C. arctata Boott sedge	Rc	M12	F-1 6 12
C. blanda Dewey sedge	Rc	B M (My)	Q-w F-5 6 11 12
C. brevior (Dewey) Mack. sedge	**Rvuc**	My	--
C. cephalophora Muhl. ex Willd. sedge	Rc	B M2 My	Q-xf X-mc PP F-1 6 7 12
C. communis Bailey sedge	Rc	My M2	F-2

C. crinita Lamarck sedge	Rc	D M2	L-mt
C. cristatella Britton sedge	Rc	M2	L-3
C. deweyana Schw. sedge	Rc	M12	F-1
C. digitalis Willd. sedge	Rc	B M2 (My)	F-6 12
C. gracilescens Steudel [**C. laxiflora** Lamarck var. **gracillima** Robinson & Fernald] sedge	**NrPrRuc**	B R My (F D S)	F-9
C. gracillima Schw. sedge	Rc	B M2 M1 (By)	X-mc F-1 11 13 L-1
C. hirtifolia Mack. sedge	Rc	M2	F-12 13
C. hitchcockiana Dewey sedge	Ruc	M2	F-8 11 12
C. intumescens Rudge sedge	Rc	B D M2 (My)	Lm
C. lacustris Willd. sedge	Rc	M2	X-c F-1 11 L-1g24
C. laxiflora Lamarck sedge	Rc	My (D)	F-12
C. leptonervia Fernald sedge	Ruc	M2	F-1 6 L-1
C. lupulina Muhl. ex Willd. sedge	Rc	D M2	X-c L-1
C. lurida Wahl. sedge	Rc	M2	Q-w
C. molesta Mack. ex Bright sedge	Ruc	M2	Q-w
C. muhlenbergii Willd. sedge	Ruc	M2	F-12
C. pedunculata Muhl. ex Willd. sedge	Rc	My M2 (D)	S-m Q-f F-3 6 11 12 13
C. pensylvanica Lamarck sedge	Rc	B M2 M1 K (D MRG F)	S-t Q-oxgfw X-mpstfh F-0 1 2 4 5 6 8 9 11 12
C. projecta Mack. sedge	**Rvuc**	M2	X-w L-12b
C. radiata (Wahl.) Small [formerly **C. rosea** Schkuhr ex Willd.] sedge	Ruc	B D M12 (My By)	Q-f X-lt L-1 F-1 5 6 11 12 13
C. retrorsa Schw. sedge	Rc	M2	L-2
C. rosea Schkuhr ex Willd. [formerly **C. convoluta** Mack.] sedge	Rc	B M2 My M1	Q-w X-c F-1 2 5 8 10 11 12 13

C. sparganioides Muhl. ex Willd. var. **sparganioides** sedge	Rc	B M2 (My)	F-1	
C. spicata Hudson * sedge	Ruc**	M2	Q-f	F-6
C. stipata Muhl. ex Willd. sedge	Rc	B M12 My	F-6	
C. tenera Dewey sedge	Rc	B M2 My	S-o Q-f X-c PP F-1 6 11 12 W-t	
C. tuckermanii Boott ex Dewey sedge	Ruc	D M2	L-12	
C. vulpinoidea Michaux sedge	Rc	M2	S-o A-w	
C. woodii Dewey [**C. tetanica** Schkuhr var. **woodii** (Dewey) Wood] sedge	**PzRc**	M2	F-1	
Cyperus esculentus L. golden nut-grass	Ruc	M2	W-mwe	
C. rivularis Kunth rivershore galingale	Rc	M2	W-w	
C. strigosus L. straw-coloured nut-grass	Rc	M2	A-w	
Dulichium arundinaceum (L.) Britton three-way sedge	**Rvuc**	M2	L-m	
Eleocharis acicularis (L.) Roehmer & Schultes needle spikerush	Ruc	M12	A-w X-w W-mw	
E. erythropoda Steudel [**E. calva** Torrey] red-based spikerush	Rc	M2	Q-w A-w W-w X-d	
E. obtusa (Willd.) Schultes fat spikerush	Rc	M2	W-w	
E. smallii Britton marsh spikerush	Ruc	M2	W-w	
Scirpus cyperinus (L.) Kunth var. **cyperinus** woolgrass	Ruc	M2	L-m W-fx	
S. microcarpus Presl var. **rubrotinctus** (Fernald) M.E. Jones [**S. rubrotinctus** Fernald] blood-stained bulrush	Ruc**	M2	W-w X-d	
S. validus Vahl softstem bulrush	Rc	M12	W-me	

ARACEAE - ARUM FAMILY

Arisaema triphyllum (L.) Schott Jack-in-the-pulpit	Rc	D M2	F-12	

LEMNACEAE - DUCKWEED FAMILY

Lemna minor L. lesser duckweed	Rc	M12	Q-w L-b W-a
Spirodela polyrhiza (L.) Schleiden purple duckweed	Ruc	M2	W-a

JUNCACEAE - RUSH FAMILY

Juncus bufonius L. toad rush	Rc	M2	A-r
J. dudleyi Wiegand Dudley's rush	Rc	M12	S-ot W-t
J. effusus L. subsp. **solutus** (Fernald & Wiegand) Hamit-Ahti soft rush	**Rvuc**	M2	L-4m
J. nodosus L. knotted rush, star rush	Ruc	M2	Q-w
J. tenuis Willd. path rush	Rc	My M2	X-c PP F-6
Luzula acuminata Raf. var. **acuminata** nodding wood rush	Rc	My E D M2	F-1 4 11
L. multiflora (Retzius) Lejeune [**L. campestris** (L.) DC. var. **multiflora** (L.) Celak.] clustered wood rush	Ruc	B My	PP

LILIACEAE - LILY FAMILY

Convallaria majalis L. • lily-of-the-valley	**Rr***	My E (D)	--
Disporum lanuginosum (Michaux) Nicholson yellow mandarin	**NrPrRc**	D M2 My M1 (F GSM S)	F-1 4 5 9 11 12
Erythronium americanum Ker yellow trout-lily	Rc	D M1	F-12
Hemerocallis fulva (L.) L. • orange day-lily	Ruc	M2	A-r
Lilium michiganense Farwell [**L. canadense** L. var. **umbelliferum** (Farwell) Boivin] Michigan lily	Rc	D M2	F-13
L. philadelphicum L. wood lily	**Rr**	D	--
Maianthemum canadense Desf. var. **canadense** wild lily-of-the-valley	Rc	D My K M12 (F By)	Q-f X-c F-0 1 2 3 F-4 5 7 8 9 11 12
var. **interius** Fernald downy-leaved wild lily-of-the-valley	Ruc	M12	X-1 F-12

Medeola virginiana L. Indian cucumber-root	Rc	B MI (D)	F-12
Ornithogalum umbellatum L. * ** star-of-Bethlehem	**Rr***	D	--
Polygonatum biflorum (Walter) Elliott smooth Solomon's-seal	**PxRuc**	D My (F)	F-1?
P. pubescens (Willd.) Pursh hairy Solomon's-seal	Rc	D E K M12 (By)	Q-f F-1 4 5 6 8 11 12
Smilacina racemosa (L.) Desf. tall false Solomon's-seal	Rc	D E K M12 (By)	Q-xf S-g X-f F-0 1 F-2 3 4 5 6 7 8 11 12
Smilax herbacea L. carrion-flower	Rc	D E K M12 (By)	Q-f L-1 F-0 1 4 5 9 11 13
S. tamnoides L. var. **hispida** (Torrey) Fernald [**S. hispida** Torrey] bristly greenbrier	Rc	M2	F-0 1 4 7 11 L-lg2
Trillium erectum L. red Trillium	Rc	AIS	--
T. grandiflorum (Michaux) Salisbury [includes formas **striatum** Louis-Marie and **viride** Farwell] large-flowered white trillium	Rc	D E AIS M12 (By)	F-12
Uvularia grandiflora J.E. Smith large-flowered bellwort	Ruc	MI (By D)	F-12

DIOSCOREACEAE - YAM FAMILY

Dioscorea villosa L. wild yam	**PxRc**	D M2 My (F GSM)	L-1

IRIDACEAE - IRIS FAMILY

Iris versicolor L. northern blue flag	Rc	M2	L-gb
Sisyrinchium montanum Greene little blue-eyed grass	Rc	D K	--

ORCHIDACEAE - ORCHID FAMILY

Epipactis helleborine (L.) Crantz * helleborine	Rc	E D K M12 (By)	F-11

— CHORIPETALOUS DICOTYLEDONS —

SALICACEAE - WILLOW FAMILY

Populus alba L. * ** white poplar	Rc	D My M12	S-e Q-f

P. balsamifera L. balsam poplar	Ruc	My E D M2	W-g
P. X canadensis Moench • •• [**P. tremuloides** Michaux X **P. deltoides** Marshall] Carolina poplar	Ruc	M2	X-d
P. deltoides Marshall eastern cottonwood	Rc	My E D M12	S-t Q-otdw X-sg F-9 11 L-g W-gt
P. grandidentata Michaux large-toothed aspen	Rc	D My E K M12 (MRG F)	Q-tgf X-pstgh L-24 F-0 1 2 3 4 5 6 8 9 F-11 12 13 W-gt
P. tremuloides Michaux trembling aspen	Rc	D My E M12 (F)	S-t Q-otgmd X-pstgfd F-2 4 6 10 11
P. tremuloides X **P. deltoides** hybrid poplar	**Rr**	S	Q-f?
Salix amygdaloides Andersson peach-leaved willow	Ruc	M2 My	Q-t X-g F-6 L-24 W-gxt
S. bebbiana Sargent Bebb's willow	Rc	M2	W-o
S. caprea L. • (••) goat willow	**Rr**	M2	X-h
S. discolor Muhl. pussy willow	Rc	M12	Q-d A-w L-tb
S. eriocephala Michaux [**S. rigida** Muhl.] stiff willow	Rc	M2 M1	Q-w A-w X-wd
S. exigua Nuttall [**S. interior** Rowlee] sandbar willow	Rc	M12	Q-w A-r W-gwt
S. fragilis L. • var. **fragilis** crack willow	Rc	M12	Q-tw A-p X-w L-gb W-gfm
S. fragilis X **S. babylonica** L. • •• weeping willow	**Rr•**	M2	X-m
S. nigra Marshall black willow	Ruc	M2	L-g
S. petiolaris J.E. Smith slender willow	Rc	M2	W-t
S. purpurea L. • basket willow	Rc	M2	Q-ow X-s

JUGLANDACEAE - WALNUT FAMILY

Carya cordiformis (Wang.) K. Koch bitternut hickory	Rc	B D G My M12 (By MRG F)	X-tfhc L-l F-0 1 3 5 F-6 7 9 10 11 12 13
C. ovata (P. Miller) K. Koch shagbark hickory	Rc	B D My E K M12 (B MRG F GSM)	S-m Q-f X-pltfh F-0 1 2 3 5 6 7 8 9 F-10 11 12 13 L-l
Juglans cinerea L. butternut	Rc	D M2	S-t P-d

J. nigra L. ** black walnut	PzRc	D My M2 (By MRG)	S-et Q-tg X-mpstgh F-1 2 3 6 7 11 12 P-pd W-g

BETULACEAE [CORYLACEAE] - BIRCH FAMILY

Betula papyrifera Marshall paper birch	Rc	My M12 (By D)	F-6 9 11
Carpinus caroliniana Walter blue beech	Rc	My E D M12 (By F)	Q-f L-24 F-1 3 5 6 8 9 11 12 13
Ostrya virginiana (P. Miller) K. Koch ironwood, hop hornbeam	Rc	D My E K M12 (By F)	Q-gf L-1 F-1 2 3 4 5 F-6 7 8 9 10 11 12 13

FAGACEAE - BEECH FAMILY

Castanea dentata (Marshall) Borkh. American sweet chestnut	NrPrRc	A (By My D GSM)	F-1?
Fagus grandifolia Ehrhart American beech	Rc	My E D M12 (By F)	Q-f F-4 6 8 9 11 12 13
Quercus alba L. white oak	Rc	B D My E K M12 (By MRG F GSM)	S-o Q-f X-tf L-12 F-0 1 2 3 4 5 6 8 9 F-11 12 13
Q. bicolor Willd. swamp white oak	PxRc	B D M2 My M1 (MRG F GSM)	L-1g23b
Q. macrocarpa Michaux bur oak	Rc	B M2 My E D (F)	S-m Q-tgf X-t F-1 2 3 5 6 12 13
Q. muehlenbergii Engelmann Chinquapin oak, yellow oak	PxRvuc	B D M2 My E (By MRG F GSM)	Q-gf X-mpagfh F-0 1 2 3 6 7 9 10
Q. rubra L. [**Q. borealis** Michaux f. var. **maxima** (Marshall) Ashe] northern red oak	Rc	B D My K M12 (By F MRG GSM)	Q-gf X-ptgfh L-1g2 F-0 1 2 4 5 6 7 8 9 F-11 12 13
Q. velutina Lamarck black oak	Rc	B D M2 My E (By MRG F)	X-plth F-0 1 3
Q. alba L. X **Q. macrocarpa** Michaux hybrid oak	Rc**	B (My By)	X-f?
Q. velutina Lamarck X **Q. rubra** L. hybrid oak	Ruc?	My M2 (By)	PP F-1

ULMACEAE - ELM FAMILY

Celtis occidentalis L. hackberry	Ruc	B My (By MRG F D)	X-f
Ulmus americana L. white elm, American elm	Rc	D My M12 (By F)	S-t Q-t X-sfhcd F-3 6 7 11 13 L-1g2b W-gm
U. rubra Muhl. red elm, slippery elm	Ruc	M2 My	X-m F-11 12
U. thomasii Sargent rock elm	Rvuc	My E (D)	–

URTICACEAE - NETTLE FAMILY

Boehmeria cylindrica (L.) Swartz false nettle	Rc	M2	X-c L-24b
Pilea pumila (L.) A. Gray clearweed, richweed	Rc	M2	F-1 2 L-24b
Urtica dioica L. subsp. **gracilis** (Aiton) Selander American stinging nettle	Rc	M12	A-f

SANTALACEAE - SANDALWOOD FAMILY

Comandra umbellata (L.) Nuttall [**C. richardsiana** Fernald] bastard-toadflax	Ruc	My E D M1 S	S-omt Q-f F-0 1 4 11

POLYGONACEAE - SMARTWEED (BUCKWHEAT) FAMILY

Polygonum amphibium L. var. **stipulaceum** Coleman [**P. natans** A.A. Eaton, includes forma **hartwrightii** (A. Gray) Stanford] water smartweed	Rc	M2	L-2 W-fmwa
var. **emersum** Michaux [**P. coccineum** Willd.] swamp smartweed	Ruc	M1	W-me
P. arenastrum Boreau [**P. aviculare** L. (in part)] prostrate knotweed	Rc	M2	S-m Q-o A-f X-s F-0
P. convolvulus L. • black-bindweed	Rc	D M2	S-e A-r F-0 X-d
P. hydropiperoides Michaux mild water pepper	Ruc	M2	L-b
P. lapathifolium L. nodding smartweed	Rc	M2	W-w
P. pensylvanicum L. var. **laevigatum** Fernald Pennsylvania smartweed	Ruc	M2	X-cd W-fmwe
P. persicaria L. • lady's-thumb	Rc	M2	W-mw
P. punctatum Elliott spotted smartweed	Ruc	M2	W-m
P. virginianum L. [**Tovara virginiana** (L.) Raf., **Antenoron virginianum** (L.) Roberty & Vautier] jumpseed, Virginia knotweed	Rc	D M2	X-c F-1 13 L-1
Rumex acetosella L. • sheep sorrel, red sorrel	Rc	E D M2	S-eomt Q-o A-f X-m F-0 4 6
R. crispus L. • curled dock	Rc	E D M12	S-e Q-omd A-rp X-sc
R. verticillatus L. swamp dock	Ruc	D M2	L-b

CHENOPODIACEAE - GOOSEFOOT (SPINACH) FAMILY

Atriplex patula L. var. **hastata** (L.) A. Gray [**A. prostrata** DC.] spreading spearscale	Rc	M2	X-c F-6
Chenopodium album L. * lamb's-quarters	Rc	D M2	S-oe Q-omd A-fic X-s
C. glaucum L. * oak-leaved goosefoot	Ruc	M2	A-f X-d
C. hybridum L. var. **gigantospermum** (Aellen) Rouleau [**C. gigantospermum** Aellen] maple-leaved goosefoot	Ruc	M2	S-emt Q-o A-fc X-s

AMARANTHACEAE - AMARANTH (PIGWEED) FAMILY

Amaranthus powellii S. Watson * green pigweed	Ruc	M2	F-11
A. retroflexus L. * redroot pigweed	Rc	M2	S-e Q-o A-f X-s

PORTULACACEAE - PURSLANE FAMILY

Claytonia virginica L. Virginia spring beauty	Rc	D My E	--
Portulaca oleracea L. * pursiane, pusley	Ruc	M2	S-oemt Q-o X-ms

CARYOPHYLLACEAE - PINK FAMILY

Arenaria serpyllifolia L. * thyme-leaved sandwort	Rc	My E D M2	S-oe
Cerastium fontanum Baumg. subsp. **triviale** (Link) Jatas * [**C. vulgatum** L.] mouse-eared chickweed	Rc	My E D M2	F-12
Dianthus armeria L. * Deptford pink	Rc	D E M2	S-oe Q-oxm X-mstc
D. barbatus L. * ** sweet William	Rr	D (S)	A-r
Moehringia lateriflora (L.) Fenzl [**Arenaria lateriflora** L.] grove sandwort	Ruc	D R E M2 (My)	F-12
Saponaria officinalis L. * bouncing bet, soapwort	Rc	D M2	Q-ox
Silene armeria L. * ** sweet-William catchfly	Rn	D	--
S. pratensis (Rafn.) Godron & Grenier [**S. alba** (P. Miller) E.H.L. Krause] white cockle	Rc	M2	A-r

S. vulgaris (Moench) Garcke • [**S. cucubalus** Wibel] bladder campion	Rc	M2	A-rl
Stellaria longifolia Willd. long-leaved stitchwort	Rc	B (My)	--
S. media (L.) Villars • common stitchwort	Rc	E M2 (D)	S-oe F-11 12

RANUNCULACEAE - BUTTERCUP (CROWFOOT) FAMILY

Actaea pachypoda Elliott [includes forma **rubrocarpa** (Killip) Fernald **A. alba** (L.) P. Miller] white baneberry, doll's-eyes	Rc	D M2	Q-f X-c F-2 5 9 11 12
A. rubra (Aiton) Willd. red baneberry	Ruc	D My E K M2	S-e Q-f F-3 12
Anemone canadensis L. Canada Anemone	Ruc	D M2	A-r X-t F-0
A. cylindrica A. Gray long-fruited Anemone	Ruc	My K	--
A. quinquefolia L. var. **bifolia** Farwell [var. **interior** Fernald] wood Anemone	Rc	D My E	F-1
A. virginiana L. [includes **A. riparia** Fernald] thimbleweed	Rc	D My E M2	Q-of X-ltfh F-0 1 8 11
Aquilegia canadensis L. wild columbine	Ruc	D My E M2	S-o Q-gf F-1 4 6 7 11 12
Hepatica acutiloba DC. sharp-lobed Hepatica	Rc	M12 (By D)	F-6 12 13
Ranunculus abortivus L. small-flowered buttercup	Rc	E D M2	Q-f L-l
R. acris L. • common buttercup	Rc	D M12 (By)	A-c
R. flabellaris Raf. yellow water buttercup	Ruc	M2	L-b
R. hispidus Michaux var. **hispidus** [includes **R. hispidus** var. **marilandicus** (Poir) Benson] bristly buttercup	PxRruc	B R My (F D)	F-1
R. pensylvanicus L. f. bristly crowfoot	Rc	M2	L-2 W-m
Thalictrum dioicum L. early meadow-rue	Rc	D E K M12 (By)	F-1 4 11
T. pubescens Pursh var. **hebecarpon** (Fernald) Boivin [**T. polygamum** Barton] tall meadow-rue	Rc	M2	W-ft

BERBERIDACEAE - BARBERRY FAMILY			
Berberis thunbergii DC. • •• Japanese barberry	Ruc	D M2	F-13
Caulophyllum thalictroides (L.) Michaux blue cohosh	Rc	M2	F-4 12
Podophyllum peltatum L. May-apple, mandrake	Rc	D E K M2	F-1 8 11 12
MENISPERMACEAE - MOONSEED FAMILY			
Menispermum canadense L. Canada moonseed	Ruc	D	--
LAURACEAE - LAUREL FAMILY			
Sassafras albidum (Nuttall) Nees Sassafras	Rc	D M12 (By)	Q-f
PAPAVERACEAE - POPPY FAMILY			
Chelidonium majus L. • greater celandine	Ruc	M2	X-c
Sanguinaria canadensis L. bloodroot	Rc	D	--
BRASSICACEAE [**CRUCIFERAE**] - MUSTARD FAMILY			
Alliaria petiolata (Bieb.) Cavara & Grande • [**A. officinalis** Andrz. ex Bieb.] garlic mustard	Rc	M2	X-h F-12
Alyssum alyssoides (L.) L. • •• pale Alyssum	Ruc	D	--
Arabis canadensis L. sicklepod	**PxRvuc**	D My K M2 (F)	Q-f F-1? 4 11
A. glabra (L.) Bernhardi tower mustard	Ruc	D My E	--
A. laevigata (Willd.) Poiret smooth rock cress	Rc	M2	F-12
Barbarea vulgaris R. Brown • var. **arcuata** (Opiz) Fries winter cress, yellow rocket	Rc	My E M12 (D)	X-sc
Camelina microcarpa Andrz. ex DC. • false flax	**Rn***	My E (D)	--
Capsella bursa-pastoris (L.) Medicus • shepherd's-purse	Rc	D My E M2	X-sc
Cardamine pensylvanica Willd. Pennsylvania bittercress	Ruc	M2	L-1

Erysimum cheiranthoides L. • wormseed mustard	Rc	M2	X-s
Hesperis matronalis L. • dame's rocket	Rc	M2	F-12
Lepidium campestre (L.) R. Brown • field pepper-cress	Rc	E M2 (D)	S-mt Q-o A-pf
L. densiflorum Schrader common pepper-grass	Rc	M2	S-oe Q-oq X-s
Rorippa palustris (L.) Besser subsp. **fernaldiana** (Butters & Abbe) Jonsell [not **R. islandica** (Murray) Borbas] marsh cress, yellow cress	Rc	M12	W-fmwt X-d
Thlaspi arvense L. • penny grass	Ruc	M2	Q-md A-fc
CRASSULACEAE - ORPINE (SEDUM) FAMILY			
Sedum acre L. • mossy stonecrop	Ruc	D E M12 (By)	S-oe Q-o X-s F-0 1
S. telephium L. • [**S. purpureum** (L.) Schultes] live-forever, purple orpine	**Rr•**	M2	X-s
PENTHORACEAE [included in **CRASSULACEAE**] - DITCH STONECROP FAMILY			
Penthorum sedoides L. ditch stonecrop	Ruc	M12	Ruc M12
SAXIFRAGACEAE - SAXIFRAGE FAMILY			
Saxifraga virginiensis Michaux early saxifrage	**Rvuc**	G E D M12 (S)	S-oe
GROSSULARIACEAE [included in **SAXIFRAGACEAE**] - GOOSEBERRY FAMILY			
Ribes americanum P. Miller American black currant	Rc	M2	F-12
R. cynosbati L. pasture gooseberry	Rc	D My E M2	Q-o X-shc L-1 F-1 3 5 6 9 11 12 13
R. rubrum L. • [**R. sativum** Syme] red currant	Ruc	My E (D)	—
HAMAMELIDACEAE - WITCH-HAZEL FAMILY			
Hamamelis virginiana L. witch-hazel	Rc	D My M2	Q-f F-1 11

ROSACEAE - ROSE FAMILY

Agrimonia gryposepala Wallroth yellow agrimony	Rc	D My M2	Q-x F-1 6 12 13
Amelanchier arborea (Michaux f.) Fernald tall Juneberry	Rc	B D G My E (MRG F S)	F-6 11
A. laevis Wiegand [**A. arborea** (Michaux f.) Fernald var. **laevis** (Wiegland) Ahles] smooth Juneberry	Rc	D G M2 K (My)	S-o Q-gf X-g F-0 1 2 3 4 5 6 8 9 11 12
A. sanguinea (Pursh) DC. (complex) dwarf Juneberry	**Rvuc**	M2	S-o X-s F-11
A. spicata (Lamarck) K. Koch (complex) var. **stolonifera** (Wiegland) Cinq-Mars shrubby Juneberry	Ruc	G M2 My (S)	X-p F-4 11 L-1
Aronia prunifolia (Marshall) Rehder [**A. melanocarpa** (Michaux) Elliott] purple chokeberry	Ruc	D G	S-o
Crataegus chrysocarpa Ashe hawthorn	**Rr**	My (F)	PP
C. crus-galli L. hawthorn	Ruc	D	–
C. dodgei Ashe hawthorn	**NrPrRr**	S	S-t?
C. holmesiana Ashe hawthorn	**Rr**	M2	F-11
C. monogyna Jacquin * English hawthorn	Rc	M2 D	X-msh
C. pedicellata Sargent hawthorn	Ruc	M2	A-r
C. punctata Jacquin dotted hawthorn	Rc	M2 My	S-m Q-xd X-mt
C. succulenta Schrader ex Link var. **macracantha** (Loudon) Eggleston hawthorn	Rc	M2	S-t Q-xf A-r X-t P-p L-1
Fragaria vesca L. woodland strawberry	Ruc	D	P-p F-0
F. virginiana P. Miller field strawberry	Rc	E D K M2	S-o Q-oxtgmdf A-rp X-mhpslyg L-12 F-1 2 3 6 11 13
Geum aleppicum Jacquin yellow avens	Ruc	E M2 (D)	Q-xf X-t L-1 F-6 7 11 13
G. canadense Jacquin white avens	Rc	E K M2 (D)	Q-gdf X-itgfhc L-12 F-0 1 3 4 5 6 7 9 10 F-11 12 13 W-g
G. laciniatum Murray cut-leaved avens	**PxRc**	M2	F-12 W-g
Malus coronaria (L.) P. Miller [**Pyrus coronaria** L.] wild crab apple	Rc	B D M2 My R (MRG F GSM)	Q-oxd X-msf F-0 1

M. pumila P. Miller • •• [**Pyrus malus** L.] apple	Rc	M12 (By D)	X-igf	
Potentilla argentea L. • silvery cinquefoil	Rc	D M2	S-oemt	
P. arguta Pursh prairie cinquefoil	**Rr**	M2 My	S-m PP	
P. inclinata Villars [includes **P. canescens** Besser and **P. intermedia** L.] downy cinquefoil	Ruc	D M1 (By)	X-c	
P. norvegica L. • rough cinquefoil	Ruc	E D M2	Q-o X-cd W-g	
P. recta L. • rough-fruited cinquefoil	Rc	D E M12	S-oemt Q-oxtmf A-rpf X-msltf P-pd	
P. simplex Michaux [includes **P. canadensis** sensu auct.] creeping cinquefoil	Rc	D E K M12 (MRG F)	Q-md X-mptgc P-p L-l F-0 1 6 9 11 12 13	
Prunus americana Marshall American wild plum	**PzRuc**	R M2 My E D (F)	X-t F-1 6 11 12	
P. avium L. • (••) sweet cherry	Ruc	D	--	
P. cerasus L. • sour cherry	**Rn**	M2 My R (F)	S-e Q-xt	
P. nigra Aiton Canada plum	Ruc	D M2	S-o F-11	
P. pensylvanica L. f. fire cherry, pin cherry	Rc	D My M2	S-ot Q-tmd P-p X-itg F-6	
P. serotina Ehrhart (wild) black cherry	Rc	D My K M12 (By MRG F)	Q-oxtgf X-sltgfhc P-p F-0 1 2 3 4 5 6 7 8 F-11 12 13 L-14	
P. virginiana L. red choke cherry	Rc	B D My E K M12 (MRG F GSM)	S-oem Q-gdf X-mtgfhc F-0 2 3 4 5 6 7 8 9 F-10 11 L-1 P-p	
Pyrus communis L. • •• pear	Rc	D M2	S-mt X-st	
Rosa blanda Aiton [includes var. **glabra** Crepin] smooth wild rose	Ruc	D My E M2	A-r X-t F-12 L-1	
R. carolina L. Carolina rose	Ruc	M2	S-oem Q-o A-c P-x L-c W-g F-0 2 6 11	
R. multiflora Murray • •• multiflora rose	Rc	D M2	X-s P-x	
R. palustris Marshall swamp rose	Rc	M2	L-tb	
Rubus allegheniensis Porter common blackberry	Rc	D My M2	S-ox Q-d X-mt F-1 2 12	
R. flagellaris Willd. northern dewberry	Rc	M2 My K	X-t PP?	

R. hispidus L. prickly dewberry	Rc	M2	L-g
R. idaeus L. var. **strigosus** (Michaux) Maximus [**R. strigosus** Michaux] wild red raspberry	Rc	My M12	A-p Q-oxtmdf X-sltgfhc S-oemt F-1 2 6 11 12
R. occidentalis L. black raspberry	Rc	My D K M2	S-e Q-x X-sltfhc A-p F-1 3 8 10 11 12
R. pensilvanicus Poiret Pennsylvania raspberry	**Rr**	S M2	Q-xf A-c X-stfc L-l F-0 1 6 11
R. pubescens Raf. dwarf raspberry	Rc	M2	F-7 L-imt
Spiraea alba Du Roi var. **alba** narrow-leaved meadowsweet	Rc	D M12	X-g L-1g2mtb
var. **latifolia** (Aiton) Dippel broad-leaved meadowsweet	**Rn**	My	–
Waldsteinia fragarioides (Michaux) Tratt. barren strawberry	Ruc	D E M12	F-0 1 2 3 4 Q-f F-5 6 9 11

FABACEAE [LEGUMINOSAE]
- PEA (PULSE) FAMILY

Amphicarpaea bracteata (L.) Fernald hog-peanut	Rc	D M2 K M1 (By)	F-1 2 4 5 6 11
Desmodium canadense (L.) DC. showy tick-trefoil	Rc	B D M2 My K (F)	X-p PP F-0 1
D. cuspidatum (Willd.) Loudon long-bracted tick-trefoil	**PzRr**	D L M2 (S)	F-0
D. glutinosum (MuhL) Wood pointed-leaved tick-trefoil	Rc	D My E K M12 (By)	Q-f A-r X-pl F-0 1 2 5 6 8 11 12 13
D. nudiflorum (L.) DC. naked-flowered tick-trefoil	**PzRuc**	D	–
D. paniculatum (L.) DC. var. **paniculatum** panicled tick-trefoil	**Rr**	M2 B My (F GSM)	S-o X-pl PP F-0 1 2
var. **dillenii** (Darlington) Isely [**D. dillenii** Darlington] Dillen's tick-trefoil	Ruc	B D M2 My (F GSM)	X-mp PP F-0 1 11
D. rotundifolium (Michaux) DC. prostrate (round-leaved) tick-trefoil	**NrPrRr**	D L M2 My (F GSM S)	PP F-0 1
Lespedeza capitata Michaux round-headed bush-clover	Rc	B D M2 My E (By MRG F GSM)	Q-o X-ph PP
L. hirta (L.) Hornemann hairy bush-clover	Ruc	D M2	F-0
L. intermedia (S. Watson) Britton wand-like bush-clover	**PzRuc**	B D G M2 My (By MRG F S)	S-o X-p PP F-0 1 2 4 5 6

Lotus corniculata L. • •• birdfoot trefoil	Rc	D E M2	S-oemt Q-om A-rp X-mps P-x F-0	
Medicago lupulina L. • black medick	Rc	D M2	Q-oxgmf A-r P-p W-x X-mitghc F-0 10	
M. sativa L. subsp. **sativa** • •• alfalfa	Rc	M12 (By D)	S-oemt Q-ox A-r X-scd F-12	
subsp. **falcata** (L.) Archangeli • •• yellow Lucerne	Ruc••	M2	A-r	
Melilotus alba Medicus • white sweet-clover	Rc	D M2	Q-oxgmd A-rp X-mstgcd F-2	
M. officinalis (L.) Pallas • yellow sweet-clover	Ruc	M2	Q-m A-r	
Trifolium hybridum L. • •• Alsike clover	Rc	M2	Q-ox X-t	
T. pratense L. • •• red clover	Rc	B M12 (By D)	S-mt Q-ox A-rpf P-x	
T. repens L. • •• white clover	Rc	E M2 (D)	Q-o A-l X-mst	
Vicia cracca L. • cow vetch	Ruc	D E M2	Q-x PP	
V. sativa L. subsp. **nigra** (L.) Ehrhart • [includes **V. angustifolia** L. and **V. sativa** var. **angustifolia** (L.) Wahlberg] common vetch	Ruc	D My E	X-s PP	
V. tetrasperma (L.) Schreber four-seeded vetch	Ruc	D	—	

LINACEAE - FLAX FAMILY

Linum virginianum L. Virginia yellow flax	NrPrRr	B My (F D GSM S)	PP	

OXALIDACEAE - WOOD-SORREL (OXALIS) FAMILY

Oxalis fontana Bunge • [**O. europaea** Jordan, **O. stricta** L. (misapplied)] European wood-sorrel	Rc	M2	S-oe Q-md X-c F-6 11 12 L-12 W-g	
O. stricta L. [**O. dillenii** Jacquin] yellow wood-sorrel	Ruc	M1	A-r	

GERANIACEAE - GERANIUM FAMILY

Geranium bicknellii Britton Bicknell's cranesbill	Rr	B D Br M2 E (S)	S-oemt Q-ox X-t	
G. maculatum L. wild Geranium	Rc	D My K M2 (F)	Q-f X-c L-l F-1 2 3 4 5 6 7 8 9 F-11 12 13	

G. robertianum L. • herb-Robert	Rc	D E M12 (By)	S-oe Q-f X-c L-l F-1 6 11 12	

RUTACEAE - RUE FAMILY

Zanthoxylum americanum P. Miller prickly ash, toothache bush	Rc	My E D M2	Q-f X-f L-l F-6 13

POLYGALACEAE - MILKWORT FAMILY

Polygala paucifolia Willd. gaywings, fringed Polygala	Rc	M2	F-11
P. polygama Walter racemed milkwort	Ruc	My (MRG F D)	PP
P. senega L. Seneca snakeroot, Senega root	**Rvuc**	D	--
P. verticillata L. whorled milkwort	Ruc	B D (My F GSM)	PP Sm

EUPHORBIACEAE - SPURGE FAMILY

Acalypha rhomboidea Raf. three-seeded mercury	Rc	B M2 (My)	X-c PP W-m
Euphorbia exigua L. • dwarf spurge	**Rn•**	M2	A-r
E. maculata L. [includes **E. nutans** sensu Fernald] hairy-fruited spurge	Ruc	M2	S-oemt Q-o A-r X-s

ANACARDIACEAE - CASHEW FAMILY

Rhus X borealis (Britton) Greene [**R. glabra** X **R. typhina**] hybrid sumac	**Rr**	My M2	S-t
R. glabra L. smooth sumac	**Rr**	B D S M2 (My)	S-oet Q-g A-r X-mt PP
R. typhina L. staghorn sumac	Rc	D My E M12 (By GSM)	S-oet Q-oxtgmdf P-d A-rp X-msltgfc F-0 1 2 6 10 12
Toxicodendron radicans (L.) Kuntze var. **radicans** [**Rhus radicans** L. var. **radicans**] climbing poison-ivy	Rc	My E D M12 (By)	Q-otf X-c L1b2 W-g F-1 3 11 12 13
var. **rydbergii** (J.E. Smith ex Rydberg) Garrett [**Rhus radicans** var. **rydbergii** (Small) Rehder] creeping poison-ivy	Rc	M2	Q-m F-6

AQUIFOLIACEAE - HOLLY FAMILY

Ilex verticillata (L.) A. Gray winterberry	Rc	B M2 (My)	L-1g4mtb

CELASTRACEAE - STAFFTREE (BITTERSWEET) FAMILY

Celastrus scandens L.	climbing bittersweet	Rc	D My E M2	Q-f X-mtf F-6
Euonymus obovatus Nutt.	running strawberry-bush	Rc	D My E M12 (By)	F-0 1 3 5 6 8 9 11 12 13 X-f L-1

STAPHYLEACEAE - BLADDERNUT FAMILY

Staphylea trifolia L.	bladdernut	Rc	M2 My E (D)	F-1

ACERACEAE - MAPLE FAMILY

Acer negundo L.	Manitoba maple, box-elder	Rc	My E D M2	X-g
A. **nigrum** Michaux f. [A. **saccharum** subsp. **nigrum** (Michaux f.) Desm.]	black maple	Ruc	M2 My (By MRG D)	F-11 12
A. **rubrum** L.	red maple	Rc	D My E M12 (F GSM)	Q-gf X-hc L-1g24 F-0 1 3 4 5 6 7 8 9 F-11 12 13 W-g
A. **saccharinum** L.	silver maple	Rc	D M2	F-1 13 X-d L-1g24b W-gm
A. **saccharum** Marshall	sugar maple	Rc	My E D K M12 (MRG F GSM)	Q-tgf X-lfhc P-d F-0 1 2 3 4 5 6 7 9 F-10 11 12 13 L-g4
A. **rubrum** X A. **saccharinum**	hybrid swamp maple	R(uc?)	M2	F-13

BALSAMINACEAE - TOUCH-ME-NOT FAMILY

Impatiens capensis Meerburgh [I. **biflora** Willd.]	spotted touch-me-not	Rc	M12	L-m W-f

RHAMNACEAE - BUCKTHORN FAMILY

Ceanothus americanus L.	New Jersey tea	Rc	My D	F-1
Rhamnus cathartica L.	common buckthorn	Ruc	D M2	Q-xf F-11 L-1

VITACEAE - GRAPE FAMILY

Parthenocissus inserta (A. Kerner) K. Fritsch [P. **vitacea** (Knerr) E. Hitchcock]	upland Virginia creeper	Rc	K M2	S-et Q-tgmdf X-th F-1 2 3 4 6 11 12 13 P-d
P. **quinquefolia** (L.) Planchon	lowland Virginia creeper	PxRvuc	My D M2	L-4b
Vitis riparia Michaux	riverbank grape	Rc	D M2 E	S-oe Q-oxtdf X-stfhc F-0 1 2 11 12 L-12b W-g

TILIACEAE - LINDEN FAMILY

Tilia americana L.	American basswood	Rc	My E D K M12 (By F)	S-t Q-f X-stfc L-4 F-0 1 2 4 5 6 7 8 11 12

MALVACEAE - MALLOW FAMILY

Abutilon theophrasti Medicus *	velvet leaf	Ruc	M2	A-c X-m W-w
Malva moschata L.	musk mallow	Ruc	D	--
M. neglecta Wallroth	cheeses	Rc	M2	A-i

GUTTIFERAE [CLUSIACEAE, HYPERICACEAE] - ST. JOHN'S-WORT FAMILY

Hypericum perforatum L. *	common St. John's-wort	Rc	D My E K M12 (By F)	S-oemt Q-ox A-r X-mpsltc F-0 12
Triadenum fraseri (Spach) Gleason [**Triadenum virginicum** L. subsp. **fraseri** (Spach) J.M. Gillett]	northern marsh St. John's-wort	Rc	M2	L-m

CISTACEAE - ROCKROSE FAMILY

Helianthemum bicknellii Fernald	Bicknell's frostweed	**PxRuc**	B D My (S)	PP Sm
Lechea intermedia Legget	common pinweed	Ruc	My	PP
L. villosa Ell.	hairy pinweed	**NrPrRc**	D	Sm

VIOLACEAE - VIOLET FAMILY

Viola arvensis Murray *	field pansey	Rc	E M2 (D)	Q-o A-r
V. canadensis L.	Canada violet	Ruc	M2	F-11
V. conspersa Reichenbach	dog violet	Rc	G My E (D)	Q-g X-t F-1?
V. cucullata Aiton	marsh blue violet	Rc	M12	X-p F-6 11
V. odorata L. * **	sweet violet	Ruc**	D	--
V. palmata L. var. **palmata** [includes **V. triloba** Schwein.]	early blue wood violet	**NrPrRuc**	R P D (My By GSM)	X-t? PP F-4? 11

V. pubescens Aiton
var. **pubescens**
downy-stemmed yellow violet — Rc — D E M2 (By) — F-1 5 6 8 11 12 13 L-12

forma **leiocarpa** (Fernald & Wiegand) Farwell]
[**V. eriocarpa** Schw.]
smooth-stemmed yellow violet — Rc — M12 — F-1 4 6 8 11 12 13

V. rostrata Pursh
long-spurred violet — Rc — D My E M2 — Q-f L-1 F-1 2 4 5 6 8 9 11

V. sagittata Aiton
[includes **V. fimbriatula** J.E. Smith in Rees]
arrow-leaved violet, northern downy violet — PzRc — R (My By D S) — S-m?

V. sororia Willd.
wooly blue violet — Rc — My E D M2 — Q-mdf L-2 F-1 4 6 11 12 13

LYTHRACEAE - LOOSESTRIFE FAMILY

Decodon verticillatus (L.) Elliott
water willow — Ruc — M2 — L-b W-e

Lythrum salicaria L. •
purple loosestrife — Rc — M2 — W-m

ONAGRACEAE - EVENING-PRIMROSE FAMILY

Circaea lutetiana L.
subsp. **canadensis** (L.) Ascherson & Magnus
[**C. quadrisulcata** (Maxim.) Franchet & Savat]
common enchanter's nightshade — Rc — D My E M12 (By) — Q-gf X-tfhc P-p F-1 3 5 6 7 9 10 F-11 12 13 L-12

Epilobium angustifolium L.
fireweed, great willow-herb — Rc — E M2 (D) — Q-o X-s

E. ciliatum Raf.
subsp. **ciliatum**
[includes **E. adenocaulon** Haussk. and **E. glandulosum** Lehmann]
northern willow-herb — Rc — D M2 — L-4 W-w

E. parviflorum Schreber •
small-flowered willow-herb — Rvuc — S — –

Ludwigia palustris (L.) Elliott
water-purslane — Rc — M12 — A-w L-b W-fw X-d

L. polycarpa Short & Peter
many-fruited false loosestrife — NrPrPr — My O2 M2 S — W-w

Oenothera biennis L. (complex)
[includes **O. parviflora** L.]
common evening primrose — Rc — D M2 (S) — Q-o X-s

O. perennis L.
meadow sundrops — Ruc — D M2 — A-c

ARALIACEAE - GINSENG FAMILY

Aralia nudicaulis L.
wild sarsaparilla — Rc — D My E M12 (By) — F-0 1 2 4 7 Q-gf F-8 11 12

APIACEAE [UMBELLIFERAE]
- CARROT (PARSLEY) FAMILY

Aegopodium podagraria L. * ** goutweed	Rr	M2	X-h
Cicuta bulbifera L. water hemlock	Rc	M2	S-o
Cryptotaenia canadensis (L.) DC. honewort	Rc	M2	F-13
Daucus carota L. * Queen Anne's lace	Rc	D E M12 (By)	S-oemt Q-oxgmd W-x P-x F-0 2 A-rpf X-mpsifhcd
Heracleum maximum Bartram [**H. lanatum** Michaux] cow-parsnip	Ruc	M2	W-f
Osmorhiza claytonii (Michaux) C.B. Clarke sweet cicely	Rc	K	F-11
O. longistylis (Torrey) DC. anise-root	Rc	D M2	F-1
Pastinaca sativa L. * wild parsnip	Ruc	M2	X-s
Sanicula canadensis L. var. **canadensis** Canada black snakeroot	PzRuc	M2 D	F-1 13 L-1
S. gregaria Bicknell black snakeroot	Rc	D M2	X-c
S. marilandica L. common black snakeroot	Rc	D My E M12 (By)	F-1 2 4 11 12 13
Sium suave Walter water-parsnip	Ruc	M12	L-124b W-mwe X-d
Taenidia integerrima (L.) Drude yellow pimpernel	Ruc	D	--
Torilis japonica (Houttuyn) DC. * hedge parsely	Ruc	D G M2	Q-f X-c F-1 11 L-1
Zizia aurea (L.) K. Koch golden alexanders	Ruc	B D	F-9

CORNACEAE
- DOGWOOD FAMILY

Cornus amomum P. Miller subsp. **obliqua** (Raf.) J.S. Wilson silky dogwood	Rc	My E M12 (D)	X-p
C. florida L. eastern flowering dogwood	PzRc	D G My K M2 (GSM)	F-5 6 12
C. foemina P. Miller subsp. **racemosa** (Lamarck) J.S. Wilson [**C. racemosa** Lamarck] gray dogwood	Ruc	B D My E K M12 (MRG F GSM)	S-oet Q-oxtgdf L-124 X-mpsitgf P-p W-gt F-0 1 2 3 4 5 6 7 9 F-11 12 13

C. rugosa Lamarck round-leaved dogwood	Rc	D My E K M2	Q-gf	X-s F-0 1 4 5
C. stolonifera Michaux var. **stolonifera** and forma **baileyi** (Coulter & Evans) red-osier dogwood	Rc	My E M12 (By D)	Q-md A-w W-gfmt	X-c

— SYMPETALOUS DICOTYLEDONS —

PYROLACEAE - WINTERGREEN FAMILY

Chimaphila umbellata (L.) Bartram var. **cisatlantica** Blake pipissewa, prince's pine	Rc	D My	--	
Monotropa uniflora (L.) A. Gray Indian-pipe	Rc	D M12 (By)	F-9	
Pyrola elliptica Nuttall shinleaf	Rc	D E	--	
P. rotundifolia L. var. **americana** (Sweet) Fernald round-leaved Pyrola	Ruc	D M2	F-9	

ERICACEAE - HEATH FAMILY

Gaultheria procumbens L. wintergreen, checkerberry	Rc	D M1 (By)	F-1	
Vaccinium angustifolium Aiton low sweet blueberry	Rc	M1 D (By)	F-11	
V. corymbosum L. highbush blueberry	Rc	B R (My)	L-g	
V. myrtilloides Michaux velvet-leaved blueberry	Ruc	G M2 My E (D)	S-ot Q-f	F-0 1 4 5
V. pallidum Aiton [V. **vacillans** Torrey] hillside blueberry	PxRc	R M2 My (F D)	F-0 1?	

PRIMULACEAE - PRIMROSE FAMILY

Lysimachia ciliata L. fringed loosestrife	Rc	D M2	X-wd F-12	W-x
L. thyrsiflora L. tufted loosestrife	Ruc	M2	L-lg2	
Samolus parviflorus Raf. [S. **floribundus** Humbolt, Bonpland & Kunth] water pimpernel	Rvuc	M2	L-l	

Trientalis borealis Raf. starflower		Rc	E (D)	—
OLEACEAE - OLIVE FAMILY				
Fraxinus americana L. white ash		Rc	D My E K M12 (By F GSM)	S-e Q-gdf P-p L-l A-p X-mpsitgfhc F-0 1 2 3 4 5 6 7 8 9 F-10 11 12 13
F. nigra Marshall black ash		Rc	M2	L-g4m
F. pennsylvanica Marshall var. **pennsylvanica** red ash		Rc	D M12	W-gm
var. **subintegerrima** (Vahl) Fernald green ash		Rc	D M2	Q-tw X-td F-11 12 13 L-1g234b W-gtt
Syringa vulgaris L. * ** common lilac		Rc	My E D M2	S-e Q-xtf A-l X-s F-0
GENTIANACEAE - GENTIAN FAMILY				
Frasera caroliniensis Walter [**Swertia caroliniensis** (Walter) Kuntze] American columbo		NrPrRr	My R (F D S)	F-6 9
APOCYNACEAE - DOGBANE FAMILY				
Apocynum androsaemifolium L. spreading dogbane		Rc	D My E K M2	S-om Q-xf F-0 1 2 4 6 11 12
A. cannabinum L. Indian hemp		Rc	My E M2 (D)	X-s
A. sibiricum Jacquin var. **cordigerum** (Greene) Fernald Siberian dogbane		Rvuc	M2	X-p
ASCLEPIADACEAE - MILKWEED FAMILY				
Asclepias exaltata L. poke milkweed		PxRc	My (F D)	F-0? 1? 2?
A. incarnata L. swamp milkweed		Rc	D M12	L-g W-fm X-d
A. syriaca L. common milkweed		Rc	My E D M12	S-em Q-x A-rpf X-mc F-13
A. tuberosa L. butterfly weed		Rc/r	M2 D (S)	S-e
CONVOLVULACEAE - MORNING-GLORY FAMILY				
Convolvulus arvensis L. field bindweed		Ruc	D My M2	S-mt Q-x

POLEMONIACEAE - PHLOX FAMILY

Phlox divaricata L.	blue Phlox	Rc	D M2	F-12

HYDROPHYLLACEAE - WATERLEAF FAMILY

Hydrophyllum virginianum L.	Virginia waterleaf	Rc	D E M2	Q-f F-6 11 13

BORAGINACEAE - BORAGE FAMILY

Cynoglossum officinale L. •	hound's-tongue	Rc	My E (D)	--
Echium vulgare L. •	viper's-bugloss	Rc	D M2	S-ot
Hackelia deflexa (Wahlberg) Opiz var. **americana** A. Gray	stickseed	Rn	My	F-1
H. virginiana (L.) Johnston	beggar's-lice	Rc/r	M2	A-r X-c F-1 6
Lithospermum arvense L. •	corn gromwell	Ruc	E (D)	--
Myosotis laxa Lehmann	small forget-me-not	Rc	D M2	L-2

VERBENACEAE - VERVAIN FAMILY

Verbena hastata L.	blue vervain	Rc	M1	W-f
V. urticifolia L.	white vervain	Rc	M2	X-c

LAMIACEAE [LABIATAE, MENTHACEAE] - MINT FAMILY

Glecoma hederacea L. •	creeping Charlie	Rc	M2	S-e
Hedeoma pulegioides (L.) Persoon	American pennyroyal	Ruc	M2 M1 (By D)	X-c F-11
Leonurus cardiaca L. •	motherwort	Rc	E M2 (D)	S-e F-6 11
Lycopus americanus Muhl.	American water-horehound	Rc	M2	A-w X-cd L-2 W-t
L. uniflorus Michaux	northern bugleweed	Rc	M12	Q-w F-12 L-1g24tb
Mentha arvensis L. var. **glabrata** (Benthom) Fernald	field mint	Rc	D M12	A-w W-mt

Monarda fistulosa L. wild bergamot	Rc	D My M12 (By MRG F)	S-oemt Q-ox A-r PP P-dx X-mpsitfh F-0 1 2 4 11	
Nepeta cataria L. • catnip	Rc	M12 (By D)	S-oemt Q-md F-11	
Prunella vulgaris L. var. **lanceolata** (Bartram) Fernald heal-all, selfheal	Rc	E D K M12 (By)	Q-xf A-r X-ptcd P-p F-1 2 6 7 12 13 L-1 W-g	
Pycnanthemum virginianum (L.) Durieu & Jackson Virginia mountain mint	**PxRuc**	D M2 (S)	S-e F-0	
Satureja vulgaris (L.) Fritsch wild basil	Rc	D M12	S-oem Q-ox X-mpsitfhc F-0 1 2 4 6 8 11	
Scutellaria galericulata L. [**S. epilobiifolia** A. Hamilton] marsh skullcap	Rc	D M12	W-f	
S. lateriflora L. mad-dog skullcap	Rc	M2	X-c L-1g2tb W-g	
Stachys palustris L. marsh hedge nettle	Rc	M2	W-m	

SOLANACEAE - NIGHTSHADE FAMILY

Physalis heterophylla Nees clammy ground-cherry	Rc	My M2 (By MRG F)	S-m PP F-11	
Solanum dulcamara L. • deadly (or bittersweet) nightshade	Rc	D E M12	S-e Q-o A-r X-sc L-124b W-mt	
S. nigrum L. var. **americanum** (P. Miller) Schulz [includes **S. americanum** P. Miller] black (or American) nightshade	Rc	M2	S-e Q-o A-c X-msc	

SCROPHULARIACEAE - FIGWORT FAMILY

Agalinis paupercula (A. Gray) Britton [**Gerardia paupercula** (A. Gray) Britton] small-flowered Agalinis	**Rvuc**	B (My)	PP	
Chaenorrhinum minus (L.) Lange • dwarf snapdragon	Rc	M2	A-r	
Chelone glabra L. turtlehead	Rc	M2	L-b	
Linaria vulgaris P. Miller yellow toadflax, butter-and-eggs	Rc	D E M2	S-oemt Q-ox A-r X-msth P-x	
Lindernia dubia (L.) Pennell false pimpernel	Ruc	M2	W-w	
Melampyrum lineare Desr. cow-wheat	Rc	D	--	

Mimulus ringens L.	square-stemmed monkeyflower	Rc	M2	L-4 W-w X-d
Pedicularis canadensis L.	wood-betony, Canada lousewort	Ruc	D	–
Penstemon digitalis Nuttall	foxglove beard-tongue	Ruc	M2	S-o X-t
P. hirsutus (L.) Willd.	hairy beard-tongue	**Rvuc**	D My	PP F-0
Verbascum thapsus L. •	common mullein	Rc	D M12 (By)	S-oemt Q-ox P-x X-mstc F-10
Veronica arvensis L. •	corn speedwell	Rc	E (D)	–
V. officinalis L. •	common speedwell	Rc	B D My E M2	S-oemt Q-ox P-x L-1 X-tc F-0 1 2 5 6 7 11
V. peregrina L. var. **peregrina**	purslane speedwell	Rc	M2	Q-mdf X-t F-6 W-g
V. scutellata L.	marsh speedwell	Rc	M2	L-4b
V. serpyllifolia L. var. **serpyllifolia**	thyme-leaved speedwell	Rc	E (D)	–

OROBANCHACEAE - BROOMRAPE FAMILY

Conopholis americana (L.) Wallroth	squawroot	**PxRvuc**	My D E (F)	F-1?
Epifagus virginiana (L.) Bartram	beechdrops	Rc	D	–

LENTIBULARIACEAE - BLADDERWORT FAMILY

Utricularia vulgaris L.	common bladderwort	Rc	M2	W-a

PHRYMACEAE - LOPSEED FAMILY

Phryma leptostachya L.	lopseed	Rc	My	Q-f F-1? 6 11 12

PLANTAGINACEAE - PLANTAIN FAMILY

Plantago lanceolata L. •	English plantain	Rc	M2	S-oemt Q-ox A-rpi X-mps P-x
P. major L. •	broad-leaved plantain	Rc	D M12	S-em Q-o A-r X-scd W-g

RUBIACEAE - MADDER FAMILY

Cephalanthus occidentalis L. buttonbush	Rc	D M12	L-12mtb W-t
Galium aparine L. cleavers	Rc	B My E D M2 (MRG F)	F-12 L-1
G. asprellum Michaux rough bedstraw	Rc	M2	Q-f
G. boreale L. var. **intermedium** DC. northern bedstraw	Ruc	M2 D	F-13
G. circaezans Michaux white wild licorice	Rc	B D M2 My E K M1 (By MRG F)	S-o Q-tgf X-mt F-0 1 2 4 5 6 8 9 F-11 12 PP P-p
G. lanceolatum Torrey yellow wild licorice	Rc	B D M2 My K (MRG)	F-0 1 4 13 L-g
G. obtusum Bigelow var. **ramosum** Gleason marsh bedstraw	Rc	M2	F-1 11 L-1
G. pilosum Aiton hairy bedstraw	NrPrRuc	D M2 My (MRG F GSM S)	S-t PP F-0 1 4
G. trifidum L. var. **trifidum** pasture bedstraw	Ruc	M2	L-12b W-g
G. triflorum Michaux sweet-scented bedstraw	Rc	D My E M2 (MRG)	Q-f P-p F-0 1 6 11 12
Mitchella repens L. partridge-berry	Rc	D My E M2	Q-f F-1 3 4 5 6 9

CAPRIFOLIACEAE - HONEYSUCKLE FAMILY

Diervilla lonicera P. Miller var. **lonicera** northern bush honeysuckle	Rc	D M2	F-4 12
Lonicera canadensis Marshall Canada fly honeysuckle	Rc	D M12 (By)	S-o F-9
L. dioica L. var. **orientalis** Gleason downy glaucous honeysuckle	Rc	My D K M2	Q-f L-1 F-0 1 6 9 11 12
L. morrowii A. Gray • Morrow's honeysuckle	Rvuc°	M2	X-tg F-1
L. tatarica L. • Tartarian honeysuckle	Rc	My M2	F-1
Sambucus pubens Michaux [S. **racemosa** L. subsp. **pubens** (Michaux) Hulten] red-berried elder	Rc	D My E M2	Q-f F-4 11 12 L-4
Symphoricarpos albus (L.) Blake var. **albus** wild snowberry	Ruc	D My E K M2	S-e F-0 1 4

Triosteum aurantiacum Bicknell [T. perfoliatum L. var. aurantiacum (Bicknell) Wiegand] wild coffee		Ruc	B D My M2	X-st PP F-1 6 L-1
Viburnum acerifolium L. maple-leaved Viburnum		Rc	B D My K M12 (By MRG F)	F-0 1 2 3 4 5 6 9 F-11 12 Q-f X-fc
V. cassinoides L. northern wild raisin		Ruc	B (My)	–
V. lentago L. nannyberry		Rc	D M2 My	Q-f X-t L-1 F-1 6 12
V. opulus L. var. opulus • •• guelder rose		Ruc	M2	F-13
V. rafinesquianum Schultes var. rafinesquianum downy arrowwood		Rc	B D My E K M2 (By MRG F)	Q-f X-igf L-1 F-0 1 F-2 3 4 5 6 9 11 12 13
V. recognitum Fernald [V. dentatum L. var. lucidum Aiton] southern arrowwood		NrPrRc	M2 M1 (By D)	L-12
V. trilobum Marshall [V. opulus L. var. americanum Aiton] highbush cranberry		Ruc	M2	L-t W-t

DIPSACACEAE - TEASEL FAMILY

Dipsacus fullonum L. • [D. sylvestris auct. Amer., non Hudson] teasel		Rc	E M12 (D)	Q-oxm A-r X-s

CAMPANULACEAE - BLUEBELL (HAREBELL) FAMILY

Campanula rapunculoides L. • creeping bellflower		Ruc	D M2	Q-t
Triodanis perfoliata (L.) Nieuwland [Specularia perfoliata (L.) A. DC.] Venus' looking glass		PxRr	A E S (My By F D GSM)	S-o? Q-x?

LOBELIACEAE - LOBELIA FAMILY

Lobelia inflata L. Indian tobacco		Rc	D M2	X-cd W-x
L. spicata Lamarck var. hirtella A. Gray pale-spiked Lobelia		Ruc	B D (My)	PP

ASTERACEAE | COMPOSITAE |
- ASTER (COMPOSITE) FAMILY

Achillea millefolium L. • yarrow	Rc	D My E M12 (By)	S-oemt Q-ox A-r P-x X-mstc F-0 2 4
Ambrosia artemisiifolia L. • common ragweed	Rc	My E D M12	S-oem Q-o A-r X-mac F-11 L-3
Anaphalis margaritacea (L.) Clarke pearly everlasting	Ruc	D	—
Antennaria neodioica Greene subsp. **neodioica** [**A. neglecta** Greene] downy small pussytoes	**PzRc**	My E M12 (By D)	Q-f PP F-0
subsp. **canadensis** (Greene) Bayer & Stebbins [**A. canadensis** Greene] smooth small pussytoes	**Rn**	D M2	F-0
A. parlinii Fernald [**A. plantaginifolia** (L.) Richards] plantain-leaved pussytoes	**PzRuc**	My D M2	S-o F-0 1
Anthemis cotula L. • stinking Mayweed	Rc	M2	A-rf L-1
Arctium lappa L. • great burdock	Ruc	My E M12 (By D)	Q-x X-c F-6 11 12
A. minus (Hill) Bernhardi • common burdock	Rc	D My M12	S-e Q-md A-rf X-c F-1 6 12
Artemisia biennis Willd. • biennial wormwood	**Rn**	My E M2 (D)	Q-ox?
Aster cordifolius L. heart-leaved Aster	Rc	D M2 My K	X-t F-0 1 5 11 12 13
A. laevis L. smooth Aster	Ruc	B D G M2 My (By MRG)	S-o Q-x PP F-0 1 2
A. lanceolatus Willd. [**A. simplex** Willd.] panicled Aster	Rc	M12 (By D)	A-r F-1 6 11 X-d L-12 W-f
A. lateriflorus (L.) Britton calico Aster	Rc	M2	X-c F-1 12 L-1234
A. macrophyllus L. large-leaved Aster	Rc	D My K M12 (By F)	F-0 1 2 4 5 6 8 9 11 F-12 13 Q-gf
A. oolentangiensis Riddell [**A. azureus** Lindley] sky blue Aster	Ruc	My	--
A. pilosus Willd. var. **pilosus** downy white Aster	**PzRuc**	B D M2 My (F)	S-m Q-oxmd X-mst P-x PP
A. puniceus L. purple-stemmed Aster	Rc	M2	W-f
A. urophyllus Lindley in Hooker [**A. sagittifolius** sensu authors not Wedem. ex Willd.] arrow-leaved Aster	Rc	B D G My M2 (MRG F)	S-omt Q-oxgmdf A-rp X-mpaltgfhc P-xpd F-0 1 2 6 7 11 12

Bidens cernua L. nodding beggar's-ticks	Rc	M12	L-gmtb W-fw
B. frondosa L. leafy beggar's-ticks	Rc	M12	A-w X-c L-g234b
B. tripartita L. European beggar's-ticks	Rc	M2	X-c
B. vulgata Greene common beggar's-ticks	Rc	M2	A-w L-b
Carduus acanthoides L. • plumeless thistle	**Rr**	D M2	S-t
Centaurea nigra L. • black knapweed	**Rr**	M2	X-s
Cichorium intybus L. • chickory	Rc	D My E M2	Q-o A-r X-sc
Cirsium arvense (L.) Scopoli • Canada thistle	Rc	My E M12 (By D)	A-rf X-t F-12
C. vulgare (Savi) Tenore • bull thistle	Rc	My E D M2	Q-o A-rp X-scd
Crepis tectorum L. • narrow hawk's-beard	Rc	M2	Q-oq
Erechtites hieraciifolia (L.) Raf. American burnweed	Rc	B M1 (By My D)	PP W-gf X-d
Erigeron annuus (L.) Persoon subsp. [redacted] annual fleabane	Ruc	M2	Q-md X-tcd F-12 W-g
subsp. **strigosus** (Muhl. ex Willd.) Wagenitz [**E. strigosus** Muhl. ex Willd.] rough fleabane	Ruc	B E M2 (D)	S-oem Q-oxgmd A-rp X-mshc
E. canadensis L. [**Conyza canadensis** (L.) Cronquist] horseweed	Rc	M2	S-oe Q-o A-r X-s
E. philadelphicus L. Philadelphia fleabane	Rc	D E	--
E. pulchellus Michaux robin's plantain	Ruc	B D M2 R (My)	S-o Q-ogf F-0
Eupatorium perfoliatum L. boneset	Rc	M2	Q-o W-fm
E. rugosum Houttuyn white snakeroot	Ruc	M2	F-11?
Euthamia graminifolia (L.) Nuttall [**Solidago graminifolia** (L.) Salisbury] narrow-leaved goldenrod	Rc	M2	S-o X-cd
Gnaphalium viscosum Humbolt, Bonpland & Kunth sticky sweet everlasting	Rvsc	B S (My)	PP Sm

Helianthus decapetalus L. ten-petalled sunflower	Ruc	My	F-0?
H. divaricatus L. woodland sunflower	Rc	D K M2	F-2
Hieracium aurantiacum L. • orange hawkweed	Rc	My E D M2	S-oer Q-ox A-rpi X-mpsifh PP F-1
H. caespitosum Dumortier • [**H. pratense** Tausch] king devil, field hawkweed	Rc	B D My E	PP
H. piloselloides Villars • [**H. florentinum** Allioni] smooth hawkweed	Rc	M2	S-oemt Q-ox A-rp X-s F-0
H. scabrum Michaux [includes **H. canadense** Michaux] rough hawkweed	Ruc	M2	F-11
Lactuca biennis (Moench) Fernald tall blue lettuce	Ruc	M2	F-11
L. canadensis L. var. **longifolia** (Michaux) Farwell Canada lettuce	Rc	E (D)	X-c
L. serriola L. • prickly lettuce	Rc	D E M2	Q-o A-r
Leucanthemum vulgare Lamarck • [**Chrysanthemum leucanthemum** L.] ox-eye daisy	Rc	My E M2 (D)	S-om Q-oxd A-rpf X-ms
Matricaria matricarioides (Lessing) Porter • pineapple weed	Rc	M2	Q-o X-s
Prenanthes alba L. rattlesnake root, white lettuce	Rc	M2	F-4 11
Rudbeckia hirta L. black-eyed Susan	Rc	M2	Q-m X-s
Solidago altissima L. [**S. canadensis** L. var. **scabrata** (Muhl.) Torrey & A. Gray] late goldenrod	Rc	D M2	A-r X-cd W-t
S. bicolor L. white goldenrod	Ruc	C M2 D	F-0 1 4 5
S. caesia L. blue-stemmed goldenrod	Rc	D My K M12 (By F)	F-0 3 4 5 6 8 Q-gf F-11 12 13 P-s
S. canadensis L. var. **canadensis** Canada goldenrod	Rc	My D M12 (By F)	S-oemt Q-oxtgmdf A-rp X-mpsitfhcd L-1 P-d F-0 1 2 6 8 11 13
S. flexicaulis L. zig-zag goldenrod	Rc	M2	F-13
S. gigantea Aiton tall goldenrod	Rc	M2	X-c

S. hispida Muhl. [**S. bicolor** L. var. **concolor** Torrey & A. Gray] hairy goldenrod	Ruc	B M2 (My)	PP F-1
S. juncea Aiton early goldenrod	Rc	D M2 (My F)	X-p
S. nemoralis Aiton gray-stemmed goldenrod	Rc	D My M2 (MRG F)	S-oe Q-oxg X-mpsit PP F-0 1 2 6 12
S. rugosa Aiton var. **asper** (Aiton) A. Gray rough-stemmed goldenrod	Rc	B M1 (By My D)	PP
S. canadensis X **S. juncea** (probable) hybrid goldenrod	**Rs**	M2	F-0
Sonchus arvensis L. subsp. **arvensis** • perennial sow-thistle	Rc	M2	Q-o A-r X-mtd
S. asper (L.) Hill spiny-leaved sow thistle	Ruc	M2	A-rf
Taraxicum officinale Weber • common dandelion	Rc	E D M12 (By)	S-oem Q-oxtmd F-0 X-psithc A-rpfl
Tragopogon dubius Scopoli • common goat's-beard	Rc	D M2	S-oe
T. pratensis L. • meadow goat's-beard	**Rs**	E M2 (D)	S-o
Tussilago farfara L. • coltsfoot	Rc	D M2	A-r
Virgulus ericoides (L.) Reveal & Keener [**Aster ericoides** L.] heath Aster	Rc	My (F)	PP
V. novae-angliae (L.) Reveal & Keener [**Aster novae-angliae** L.] New England Aster	Rc	D M2	Q-ox A-rp X-stcd PP F-12
Xanthium strumarium L. cocklebur	Rc	M2	W-f X-d

— EXCLUDED RECORDS —

The following 27 records of plant species occurrences which have been reported in the literature are excluded from the flora at the present time for the indicated reasons.

Cystopteris fragilis (L.) Bernhardi

northern fragile fern

This fern was reported by Macdonald (1976) and de Boer et al. (1982); there probably is taxonomic confusion with **C. tenuis.**

Dichanthelium villosissimum (Nash) Freckmann
var. **praecocius** (A.S. Hitchcock & Chase) Freckmann
[**D. acuminatum** (Swartz) Gould & Clarke
var. **praecocius** (A.S. Hitchcock & Chase) Dore]

villous panic grass

This is a provincially rare grass which was initially reported by Maycock (1977 a) and was subsequently repeated by Fahselt et al. 1979 and by de Boer et al. (1982); it was not mapped from area by Ontario Rare Plant Atlas (1984) nor was it reported by Sutherland (1987); Macdonald searched for this species, but all suitable hiruste specimens proved to be **D. acuminatum** or **D. linearifolium**; possibly there is no voucher collection by Maycock.

Carex grayi Carey

sedge

This sedge was reported by de Boer et al. (1982), but the specimen was redetermined by Sutherland (1987) to be **C. lupulina.**

Sisyrinchium angustifolium P. Miller

narrow-leaved blue-eyed grass

This graminoid herb was reported by Kaiser (1986) who indicates (1988) that it is likely mistaken for **S. montanum**; it was not listed in the region by Sutherland 1987.

Carya glabra (P. Miller) Swartz
[includes **C. ovalis** (Wang.) Sargent]

pignut hickory

This provincially rare tree species was reported by Ecological Services for Planning (1977) and by de Boer et al. (1982); it possibly is based on the records of Maycock and Fahselt, but the Maycock collection (TRTE) was redetermined by Ball to be **C. ovata.**

Carya laciniosa (Michaux f.) Loud

kingnut hickory

This is a provincially rare tree species; it was tentatively recorded by Maycock in his field note transcriptions, but it appears to be without a voucher collection; it was not indicated from area in the Ontario Rare Plant Altas or by Sutherland (1987), and possibly is the common **C. ovata.**

Quercus prinus L.

rock chestnut oak

This tree reported in de Boers et al. (1982) who cites Maycock; however, no note appears in Maycock's transcription notes; it possibly is **Q. muehlenbergia.**

A. hirsuta (L.) Scopoli
var. **pycnocarpa** (Hopkins) Rollins

hairy rock cress

This regionally rare herb species was reported by de Boer et al. (1982), but a voucher collection could not be located (WAT) or confirmed; it was not indicated from area by Sutherland 1987, and possibly was mistaken for **A. glabra.**

Amelanchier alnifolia Nuttall

Saskatoon berry

This regionally rare shrub species was reported by de Boer et al. (1982), but was without a collection; it was not indicated from the area by Sutherland (1987); it possibly is **A. sanguinea.**

Prunus angustifolia Marshall

Chickasaw plum

This tall shrub was reported by de Boer et al. (1982) who cited Ecological Services for Planning (1977); this is considerably beyond its normal range; it possibly is **P. nigra**

Rosa acicularis Lindley

wild rose

This shrub was reported by Kaiser (1986), but he advises (1988) that this probably is **R. carolina.**

Rubus arundelanus Blanchard

blackberry

This shrub is tentatively included in Maycock's transcription of his field notes; it possibly is **R. flabellaris.**

Spiraea alba Du Roi
var. **latifolia** (Aiton) Dippel

broad-leaved meadowsweet

Maycock's transcriptions of his field notes (1977 a) indicate a tentative occurrence of this variety of the species; however, no collection is apparently available, and Soper & Heimburger (1982) do not indicate that the occurrence of this taxon here is unlikely

Vicia americana Willd.

American vetch

This northern and western herb species was reported by de Boer et al. (1982) who's vouching specimen (WAT) could not be located or confirmed; it was not listed from the region by Sutherland (1987), but Suffling (1989) indicates confidence in the determination; it possibly was mistaken for **V. cracca.**

Helianthemum canadense (L.) Michaux
Canada frostweed

This provincially rare herb species was reported in Maycock's field note summaries from former prairie area, possibly citing Ball's preliminary collection notes; however, the vouching specimen from this site (TRTE) is **H. bicknellii**.

Viola pedata L.
var. **linariloba** DC.
bird's-foot violet, pansy violet

This provincially rare herb species was reported by Maycock (1977 a), Ecological Services for Planning (1977) and by de Boer et al. (1982); however, all the vouching collections (TRTE, WAT) have been redetermined to be **V. palmata**.

Viola septentrionalis Greene
northern downy blue violet

This northern herb was reported by Ecological Services for Planning (1977), but in an unlikely habitat; it possibly is a misidentification of **V. pubescens** or **V. sororia**.

Oenothera cruciata Nuttall
cross-shaped evening primrose

This herb was reported by de Boer et al. (1982); it was not listed by Sutherland (1987), and possibly is a misidentification of **O. perennis**.

Oenothera fruticosa L.
evening primrose

This was reported by de Boer et al. (1982), but the voucher collection was redetermined by A. Dugal to **O. perennis**; it was not listed in the Ontario Rare Plant Atlas, nor by Sutherland (1987).

Thaspium barbinode (Michaux) Nuttall
hairy-jointed meadow parsnip

The specimen fo this claim was collected by Ball in 1977, but it was redetermined by K.M. Pryer as **Zizia aurea**; all secondary citations of **Thaspium** in the literature by Fahselt et al.)1979), Beechey (1977), de Boer et al. (1982) and others, should be **Zizia aurea**; it was not mapped from the area by the Ontario Rare Plant Atlas, nor by Sutherland (1987).

Pyrola asarifolia Michaux
pink Pyrola

This herb was reported by de Boer et al. (1982) who cites Beechey (1977); it was not listed by Sutherland (1987), and possibly is a misdetermination of **P. rotundifolia**.

Pycnanthemum tenuifolium Schrader
narrow-leaved mountain mint

A provincially rare herb which was reported by de Boer et al. (1982), but the vouching collection (WAT) was redetermined by Sutherland (1987) to **P. virginianum**.

Satureja glabella var. **glabella** - savory

de Boer's determination of her specimen of Carolina Ruellia (s.n.: WAT) from the vicinity of the ANSI is reported in Sutherland (1987) to have been redetermined to be **"Satureja glabella"**; however, he recently indicates that this was a mistake, and the true identification is **S. vulgaris**, a common herb.

Ruellia caroliniensis (Walter) Steudel Carolina Ruellia

This very rare species was reported by de Boer et al. (1982), but the vouching collection (WAT) was redetermined by Sutherland (1989) to **Satureja vulgaris**, but was mistakenly entered into the regional flora as being from the area as **S. glabella** (Sutherland 1987); here **Ruellia** would be considerably beyond its range.

Matricaria chamomilla L. chamomile

This introduced herb was reported by de Boer et al. (1982) with a vouching collection; however, it was not listed by Sutherland (1987); it possibly may be **Matricaria matricarioides** or **Anthemis cotula**, although Suffling (1989) indicates his confidence in the record.

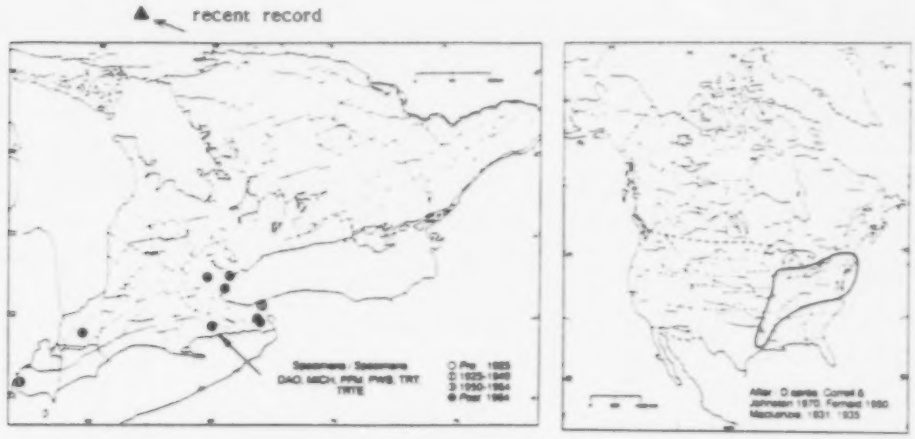
Taraxacum erythrospermum Bessey red-seeded dandelion

This regionally rare introduced herb has only a tentative sighting by Macdonald (1988) and there is no voucher collection.

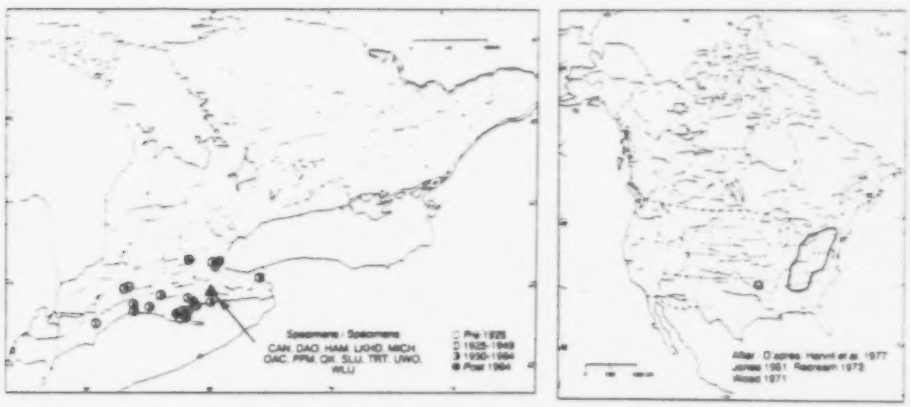
Virgulus sericeus (Ventenat) Reveal & Keener [**Aster sericeus** Ventenat] western silver-leaved Aster

This provincially rare species was reported in de Boer et al. (1982) who cited Ecological Services for Planning (1982); it is a very unlikely occurrence since it would be considerably beyond its normal western range.

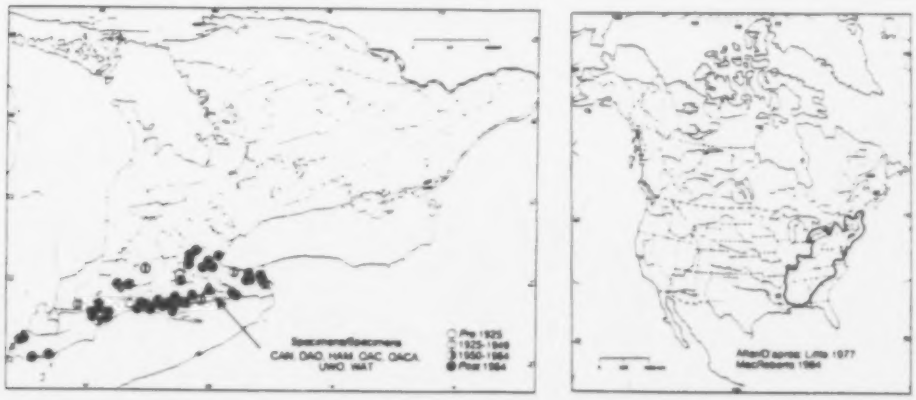
APPENDIX B: PROVINCIAL DISTRIBUTION FOR NATIONALLY AND PROVINCIALLY RARE VASCULAR PLANTS OF THE ORISKANY SANDSTONE AND WOODLANDS AREA OF NATURAL AND SCIENTIFIC INTEREST



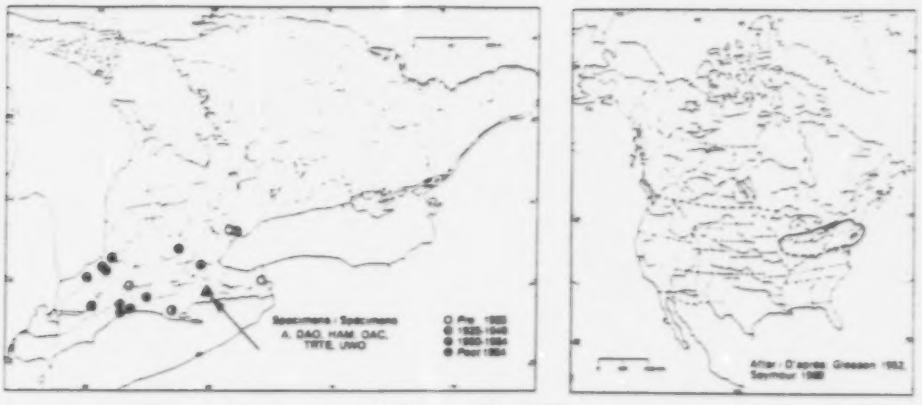
Carex gracilescens Steud.



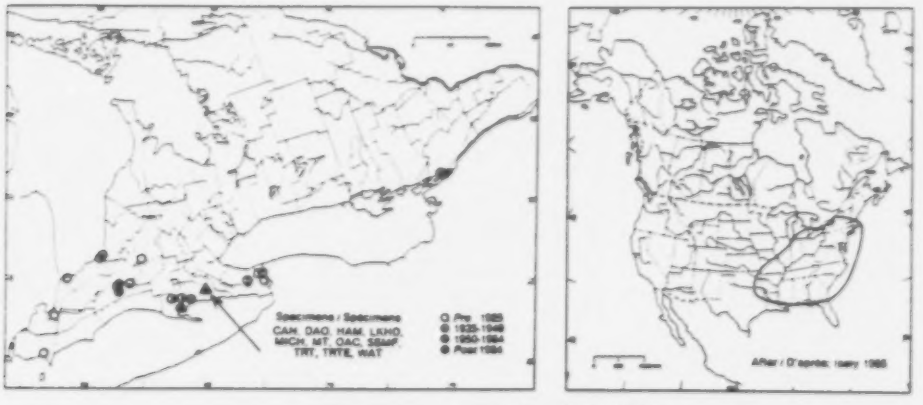
Disporum lanuginosum (Michx.) Nicholson



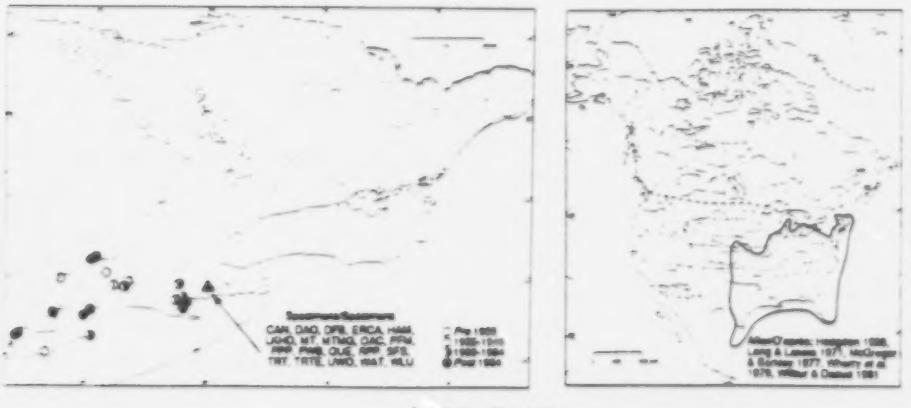
Castanea dentata (Marsh.) Borkh.



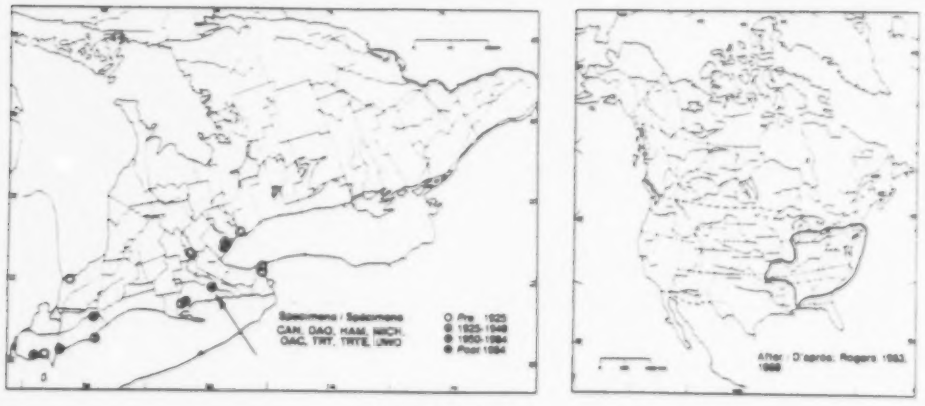
Crataegus dodgei Ashe



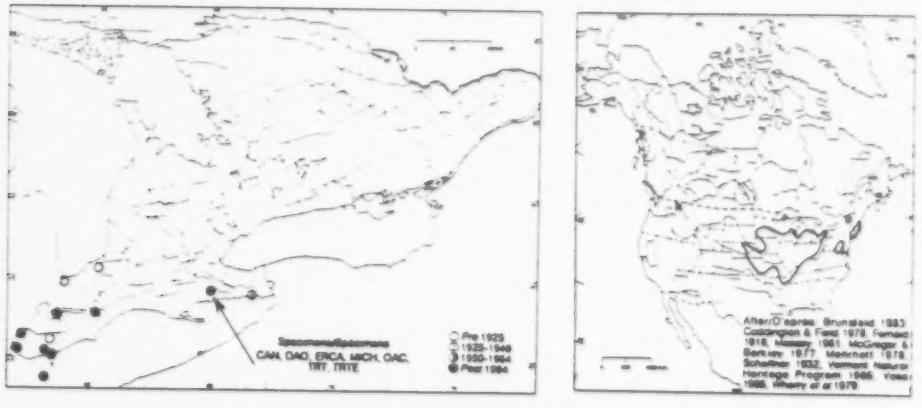
Desmodium rotundifolium (Michx.) DC.



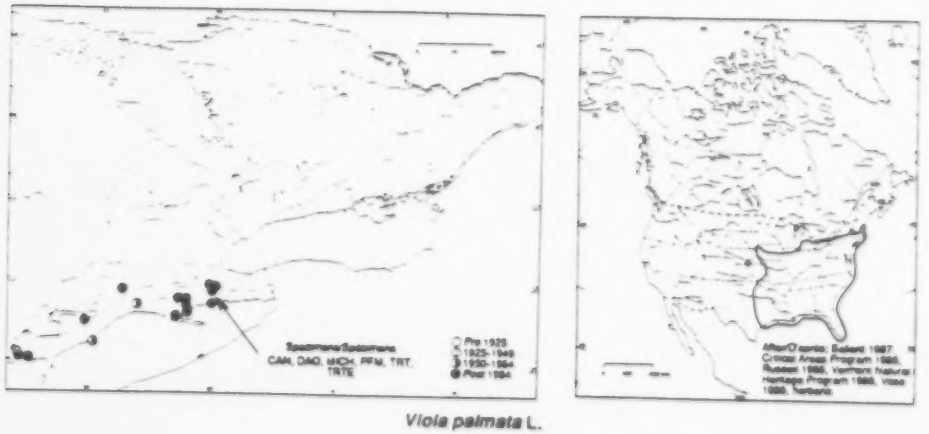
Lespedeza villosa Ell.



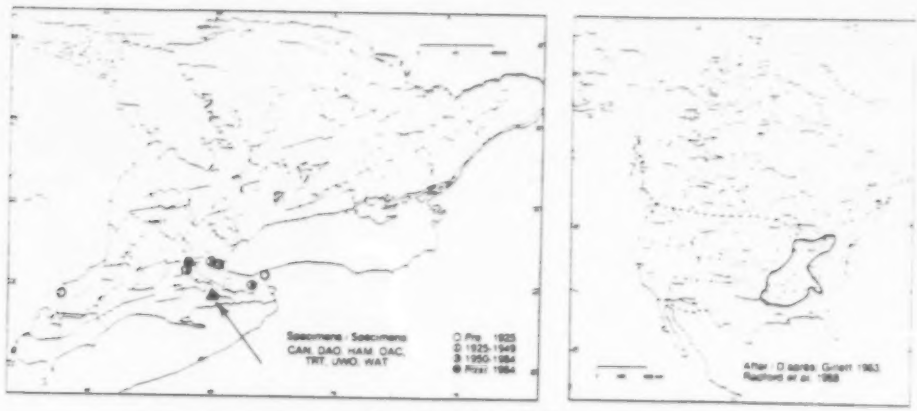
Linum virginianum L.



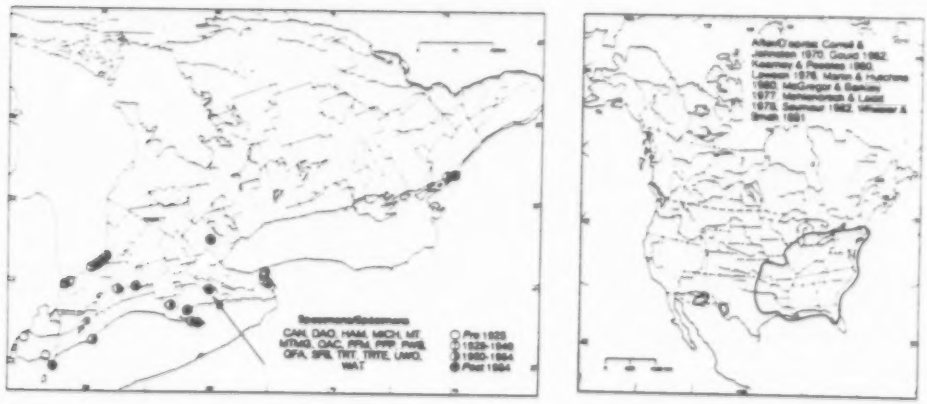
Ludwigia polycarpa Short & Peter



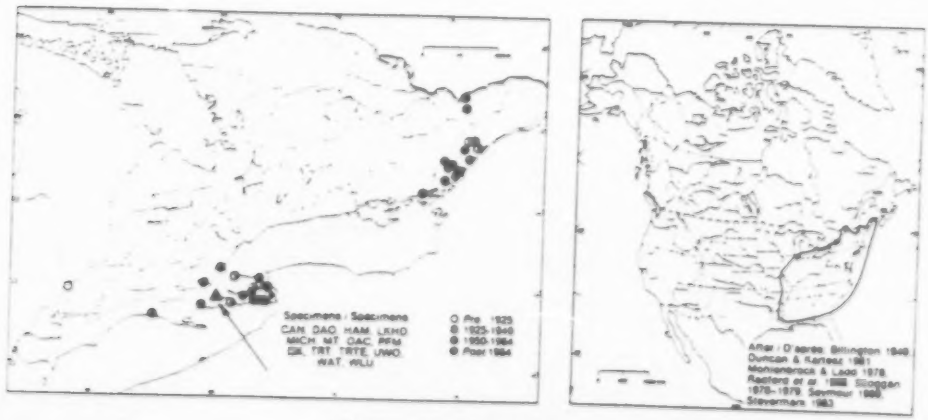
Viola palmata L.



Frasera caroliniensis Walt.



Galium pilosum Ait.



Viburnum recognitum Fern.

APPENDIX C: MOSS AND LICHEN FLORA OF THE ORISKANY SANDSTONE AND WOODLANDS AREA OF NATURAL AND SCIENTIFIC INTEREST

SOURCES

C1	F.S. Cook 1977
F	D. Fahselt 1980
M2	I.D. Macdonald: 7 - 22 Aug. 1988
C2	F.S. Cook 1989 (identifications of Macdonald 1988 collections)

MOSSES	SOURCES
Anomodon attenuatus (Hedw.) Hub.	F M2 C2
Anomodon rostratus (Hedw.) Schimp.	F C1 M2
Brachythecium salebrosum (Web. & Mohr) B.S.G.	F? C2
Brachythecium species	C2
Bryum caespiticum (Hedw.) Kop.	C2
Bryum creberrimum Tayl.	F
Campylium chrysophyllum (Brid.) J. Lange	C2
Campylium hispidulum (Brid.) Mitt.	F
Campylium polygamum (B.S.G.) C. Jens.	C2
Ceratodon purpureus (Hedw.) Brid.	F C2
Drepanocladus species	C1
Entodon cladorrhizans (Hedw.) C. Mull.	F
Entodon seductrix (Hedw.) C. Mull.	F C2
Eurhynchium hians (Hedw.) Sande Lac.	C2
Fissidens cristatus Wils. ex Mitt.	M2 C2
Grimmia apocarpa Hedw.	F M2
Grimmia pulvinata (Hedw.) Sm.	C1
Hedwigia ciliata (Hedw.) P. Beauv.	F C1 M2 C2
Mnium marginatum (With.) Brid. ex. P. Beauv.	C2
Orthotrichum anomalum Hedw.	C1
Plagiomnium cuspidatum (Hedw.) Kop.	F
Plagiomnium medium (B.S.G.) Kop.	F
Plagiothecium denticulatum (Hedw.) B.S.G.	C2
Platygyrium repens (Brid.) B.S.G.	C2

Pleurozium schreberi (Brid.) Mitt.	C1 M2
Polytrichum commune Hedw.	C2
Polytrichum juniperinum Hedw.	F M2
Polytrichum piliferum Hedw.	F M2 C2
Rhodobryum ontariense (Kindb.) Kindb.	F
Thuidium recognitum (Hedw.) Lindb.	F M2
Tortula ruralis (Hedw.) Gaertn., Meyer, & Scherb.	F C1 M2
LIVERWORTS	
Radula complanata (L.) Dum.	C2
LICHENS	
Cladonia chlorophaea (Flk.) Sprengel	F M2
C. cristatella Tuck.	F
C. cylindrica (Evans) Evans	F
C. decorticata (Flk.) Sprengel	F M2
C. grayi Merr.	F
C. mitis (Sandst.) Hale & Cole	F M2
C. norrisii Vain.	F
C. pyxidata (L.) Hoffmamm	F M2
C. uncialis (L.) Wigg.	F M2
Peltigera canina (L.) Willd. var. **canina**	F
P. elizabethae Gyel.	F
P. evansiata Gyel.	F
P. polydactyla (Neck.) Hoffm.	F
P. praetextata (Somm.) Vain.	F
P. rufescens (Weiss) Humb.	F
Physcia millegrana Degel.	F
Xanthoparmelia cumberlandia (Gyel.) Hale	F

APPENDIX D: HERPTILE FAUNA OF THE ORISKANY SANDSTONE AND WOODLANDS AREA OF NATURAL AND SCIENTIFIC INTEREST

SIGNIFICANCE

Nr	Nationally rare
Pr	Provincially rare
Rr	Regionally rare

ABUNDANCE
(Haldimand-Norfolk Region, after Gartshore 1987)

A	abundant (> 100)
V	very common (51 - 100)
C	common (26 - 50)
U	uncommon (6 - 25)
R	rare (1 - 5)
Th	threatened

SOURCES

B	S. Banticks: resident
D	G. de Boer: Apr. - Nov. 1980, May - Sept. 1981
E	Ecological Services for Planning: 1977
F	M. Furber: July 1979 - July 1980
G	M.E. Gartshore: 15 April 1985
GSM	Gartshore, Sutherland & McCracken 1987 (Vols. I:94-96, II: Herptiles)
J	W.W. Judd: 30 July 1976
M	I.D. Macdonald: 7 - 22 August 1988
Mc	J. McCracken: 15 April 1985
P	J. Plank: pre-1977
S	D.A. Sutherland: 25 April 1986
V	B. Vanderburg: resident
W	J.M. Webber (Laudenbach): 9 Sept 1977

AMPHIBIANS	SIGNIFICANCE	ABUNDANCE	SOURCES
Eastern Red-backed Salamander **Plethodon cinereus**		A W	F G Mc S
American Toad **Bufo americanus**		A W	F M
Spring Peeper **Hyla crucifer**		A W	Mc
Striped Chorus Frog **Pseudacris triseriata**		A W	Mc
Northern Leopard Frog **Rana pipiens**		A W	F
Bullfrog **Rana catesbeiana**		V W	G

REPTILES

Snapping Turtle **Chelydra serpentina**		C W	B
Painted Turtle **Chrysemys picta**		A W	M
Common (Eastern) Garter Snake **Thamnophis sirtalis**		A W	B! F D G Mc S M
Eastern Ribbon Snake **Thamnophis sauritus septentrionalis**		U W	F
Northern Water Snake **Nerodia sipedon**		U W	M
Northern Brown Snake **Storeria dekayi**		U W	F
Smooth Green Snake **Opheodrys vernalis**		U W	F M
Black Rat Snake **Elaphe obsoleta obsoleta**	NrPrRr	R Th	B D P V W J F E GSM
Eastern Milk Snake **Lampropeltis triangulum**		U W	F

SIGHTINGS OF SIGNIFICANT HERPTILE SPECIES WITHIN ANSI

Black Rat Snake - Elaphe obsoleta obsoleta
(Nationally, Provincially and Regionally Rare species)

S. Banticks (resident): reports having seen at least three snakes over several years on the Dry Lake Road north of Town Line Road

G. de Boer: reports seeing a dead snake in the vicinity of the large quarry in July 1981 (UTM 858562); no specimen was taken

Ecological Services for Planning: according to de Boer et al. (1982), the survey team for this report did not see any snakes in the Environmental Protection Area

F. Gilbert: Gartshore (1987) reports that he had collected one specimen from the Oriskany Sandstone Formation and it is preserved in the Department of Zoology and the University of Guelph.

W.W. Judd: in Fahselt (1977) he reports seeing one adult snake on 30 July 1976 along the north side of Town Line Road 200 m east of Dry Lake Road (UTM 859554)

M. Furber: cited in de Boer et al. (1982); Gartshore et al. (1987) indicates that he saw 2 specimens in the area in 1978 and 1981, but gives no location information

J. Plank: cited in Beechey (1977) as having seen one live snake in the vicinity before 1977

B. Vanderberg: reports having seen "many" Black Rat Snakes over the past three decades throughout the study area and vicinity; he says that snakes congregate and overwinter in the vicinity of the old quarry works on the north side of Town Line Road (UTM 864556); he also reports that, in the past, residents in the area tended to kill the snakes, fearing their size, and that during the summer they are occasionally found dead on the two roads in the study area

J. Webber (Laudenbach): during a field visit on 9 Sept. 1977 saw one snake on the east side of Dry Lake Road to the east of the larger quarry (UTM 857558); measurements and photograph taken

(no specimens were seen by the author during the Aug. 1988 survey)

APPENDIX E: BIRD FAUNA OF THE ORISKANY SANDSTONE AND WOODLANDS AREA OF NATURAL AND SCIENTIFIC INTEREST

SIGNIFICANCE

Nr	Nationally rare
Pr	Provincially rare
Rr	Regionally rare
*	introduced

REGIONAL OCCURRENCE
(in Haldimand-Norfolk, after McCracken 1987)

ABUNDANCE (number breeding pairs)

A	abundant (> 5000)
V	very common (5000 - 1001)
C	common (1000 - 101)
U	uncommon (100 - 50)
R	rare (< 50)

UBIQUITY (number Atlas squares)

Wx	extremely widespread (46 - 51)
Wv	very widespread (41 - 45)
Wo	widespread (31 - 40)
Wf	fairly widespread (21 - 30)
Lf	fairly local (11 - 20)
Lv	very local (6 - 10)
Lx	extremely local (1 - 5)

FREQUENCY (number years between nestings)

I	irregular (1 - 5 years)
O	occasional (5 - 10 years)
S	sporadic (10 - 20 years)
C	casual (20 years)

SEASONAL OCCURRENCE WITHIN ANSI
(after Furber)

PR	permanent resident
SR	summer resident
LSR	local summer resident
WR	winter resident
M	migrant

SOURCES WITHIN ANSI

B	S. Banticks: Jan. - Aug. 1988
F	M. Furber: July 1979 - July 1980, 10 June 1981, June 1984, June 1985
M	L.D. Macdonald: 7 - 22 Aug. 1988
Mc	J. McCracken: 10 June 1985, 15 June 1985
V	B. Vanderburg: Jan. - Aug. 1988
GSM	Gartshore, Sutherland & McCracken 1987
!	indicates breeding success observation

BREEDING SUCCESS AND NESTING RECORDS IN ANSI AND VICINITY
(after McCracken 1987.b, Gartshore et al. 1987.a, Cadman et al. 1987, Furber 1980, Macdonald 1988, Banticks 1988, Vanderburg 1988, indicating numbers for ANSI)

WITHIN ANSI

n	nests
sm	singing males
p	paired birds
fs	fecal sack carrying
sh	in suitable habitat
o	offspring hatched

WITHIN BREEDING BIRD ATLAS SQUARE

con	confirmed
prob	probable
pos	possible

	SIGNIFICANCE	REGIONAL OCCURRENCE	SEASONAL OCCURRENCE	SOURCES	BREEDING SUCCESS	ATLAS SQUARE
Pied-billed Grebe **Podilymbus podiceps**		U Lv	SR	F		con
American Bittern **Botaurus lentiginosus**		U Lf	SR	F M		prob
Great Blue Heron **Ardea herodias**		C Wf	SR	F M		pos
Green-backed Heron **Butroides striatus**		U Wo	SR	F		pos
Tundra Swan (Whistling Swan) **Olor columbianus**		—	M	F		
Canada Goose **Branta canadensis**	•	C Wv	M SR	F M V!	57 o	con
Wood Duck **Aix sponsa**		C Wo	SR	F M Mc!	1 p	con
American Black Duck **Anas rubripes**		U Lf	—	M		
Mallard **Anas platyrhynchos**		C We	SR	F M		con
Blue-winged Teal **Anas discors**		C Wo	SR	F		con
Northern Shoveler **Anas clypeata**	PrRr	R Le	I M	F		
American Wigeon **Anas americana**	Rr	R Le	O M	F		
Ring-necked Duck **Aythya collaris**		—	M	F		
Bufflehead **Bucephala albeola**		—	M	F		
Hooded Merganser **Lophodytes cucullatus**	Rr	R Lv	M	F		
Turkey Vulture **Cathartes aura**		U Wv	SR	F M Mc!	2 sh	pos
Northern Harrier (Marsh Hawk) **Circus cyaneus**	Rr	R Wf	M	F M		con
Sharp-shinned Hawk **Accipter striatus**	Rr	R Lf	M	F		
Cooper's Hawk **Accipiter cooperii**	PrRr	R Lv	M	F		
Rough-legged Hawk **Buteo lagopus**		—	M/WR	F		
Broad-winged Hawk **Buteo platypterus**		U Lf	M	F M		

Red-tailed Hawk **Buteo jamaicensis**		C	We	PR/M	B F M	con
American Kestrel **Falco sparverius**		C	We	PR/M	F M	prob
Ring-necked Pheasant **Phasianus colchicus**	•	U	Lf	PR?	M	con
Ruffed Grouse **Bonasa umbellus**		C	Wo	PR	B F M	con
American Coot **Fulica americana**		C	Lf	SR	M	prob
Killdeer **Charadrius vociferus**		C/V	We	SR	F M	con
Spotted Sandpiper **Actitis macularia**		C	We	SR/M	F M	prob
Greater Yellowlegs **Tringa melanoleuca**		--		M	F	
Lesser Yellowlegs **Tringa falvipes**		--		M	F	
American Woodcock **Scolopax minor**		C/V	Wv	SR	F M	con
Ring-billed Gull **Larus delawarensis**		A	Lv	LSR/M	F M	
Herring Gull **Larus argentatus**	Rr	C	Lv	LSR/M	F M	pos
Rock Dove **Columba livia**	•	A	Wv	PR	B F M	pos
Mourning Dove **Zenida macroura**		A	We	PR	B F M	con
Black-billed Cuckoo **Coccyzus erythropthalmus**		U/C	Wo	SR	F	prob
Yellow-billed Cuckoo **Coccyzus americanus**		U	Wf	SR	F GSM	prob
Eastern Screech-Owl **Otus aiso**		U/C	Wv	PR	F	prob
Great Horned Owl **Bubo virginianus**		C	Wv	PR	F	con
Barred Owl **Strix varia**	Rr	R	Le	--	M	
Eastern Screech-owl **Otus asio**		U/C	Wv	--	B	pos
Common Nighthawk **Chordeiles minor**		C	Lf	LSR	B F M	pos

Whip-poor-will **Caprimulgus vociferus**		C	Lf	M	F		pos
Chimney Swift **Chaetura pelagica**		--		LSR	F M		prob
Ruby-throated Hummingbird **Archilochus colubris**		C	We	SR	F		pos
Belted Kingfisher **Ceryle alcyon**		C	We	SR	F M		prob
Red-headed Woodpecker **Melanerpes erythrocephalus**		U	Wv	LSR	F		pos
Red-bellied Woodpecker **Melanerpes carolinus**	NrPrRr	R	Lv	S R	GSM	2 p	con
Yellow-bellied Sapsucker **Sphyrapicus varius**		U	Lf	M	F M		
Downy Woodpecker **Picoides pubescens**		V	We	PR	F M		prob
Hairy Woodpecker **Picoides villosus**		V	Wv	PR	F		con
Northern Flicker **Colaptes auratus**		V	We	SR	F M		prob
Eastern Wood-Pewee **Contopus virens**		A	We	SR	F M		prob
Willow Flycatcher **Empidonax traillii**		V	We	LSR	F GSM		prob
Least Flycatcher **Empidonax minimus**		C	Wo	M/LSR	F		prob
Eastern Phoebe **Sayornis phoebe**		U	Wo	LSR	F		
Great Crested Flycatcher **Myiarchus crinitus**		V	Wo	SR	F		prob
Eastern Kingbird **Tyrannus tyrannus**		C	We	SR	F M		con
Horned Lark **Eremophila alpestris**		C	We	WR	F		prob
Purple Martin **Progne subis**		C	We	LSR	F		prob
Tree Swallow **Tachycineta bicolor**		V	We	SR	F M		con
Bank Swallow **Riparia riparia**		A	Wv	M/LSR	F		
Barn Swallow **Hirundo rustica**		A	We	SR	F M!	3 n	con

Blue Jay **Cyanocitta cristata**		A	We	PR	F	M		con
American Crow **Corvus brachyrhynchos**		V	We	PR	F	M		con
Black-capped Chickadee **Parus atricapillus**		A	We	PR	F	M		con
Red-breasted Nuthatch **Sitta canadensis**		U	Lf	M	F			
White-breasted Nuthatch **Sitta carolinensis**		C	We	PR	F	M		con
Brown Creeper **Certhia americana**	Rr?	R/U	Lf	M/WR	F			
House Wren **Troglodytes aedon**		A	We	SR	F	Mc!	5 sm	con
Winter Wren **Troglodytes troglodytes**	Rr	R	Lv	M	F			
Golden-crowned Kinglet **Regulus satrapa**	Rr	R	Lv	M	F			
Ruby-crowned Kinglet **Regulus calendula**		—		M	F			
Blue-gray Gnatcatcher **Polioptila caerulea**		C	Wv	M/LSR	F			pos
Veery **Catharus fuscescens**		A	Wo	M	F			pos
Gray-cheeked Thrush **Catharus minimus**		—		M	F			
Swainson's Thrush **Catharus ustulatus**		—		M	F			
Hermit Thrush **Catharus guttatus**	Rr	R	Lv	M	F			
Wood Thrush **Hylocichla mustelina**		A	Wv	SR	F			con
American Robin **Turdus migratorius**		A	We	SR	B	F	M Mc! 1 sm	con
Gray Catbird **Dumetella carolinensis**		A	We	SR	F	M	Mc! 2 sm	con
Brown Thrasher **Toxostoma rufum**		V	We	SR	F	M	Mc! 1 fs	con
Cedar Waxwing **Bombycilla cedrorum**		V	We	SR	F	M	Mc! 2 sh	prob
European Starling **Sturnus vulgaris**		•		A We	PR		F	con

Solitary Vireo **Vireo solitarius**	Rr	R	Lv	M	F	
Yellow-throated Vireo **Vireo flavifrons**		C	Wo	M	F	prob
Warbling Vireo **Vireo gilvus**		C/v	We	SR	F	prob
Red-eyed Vireo **Vireo olivaceus**		A	We	SR	F M Mc! l sm	con
Golden-winged Warbler **Vermivora pinus**		C	Wf	LSR	F	pos
Tennesee Warbler **Vermivora peregrina**		—		M	F	
Nashville Warbler **Vermivora ruficapilla**	Rr	R	Lv	M	F	
Yellow Warbler **Dendroica petechia**		A	We	SR	F Mc! l sm	con
Chestnut-sided Warbler **Dendroica pensylvanica**		C	Wf	M	F	
Magnolia Warbler **Dendroica magnolia**	Rr	R	Le	M	F	
Yellow-rumped Warbler **Dendroica coronata**	Rr	R	Le	M	F	
Cape May Warbler **Dendroida tigrina**		—		M	F	
Black-throated Blue Warbler **Dendroica caerulescens**		-		M	F	
Black-throated Green Warbler **Dendroica virens**	Rr	R	Lf	M	F	
Blackburnian Warbler **Dendroica fusca**	Rr	R	Lv	M	F	
Palm Warbler **Dendroica palmarum**		—		M	F	
Bay-breasted Warbler **Dendroida castanea**		—		M	F	
Cerulean Warbler **Dendroica cerulea**		C	Wf	M/LSR	F	
Black-and-white Warbler **Mniotilta varia**		U	Lf	M	F M	
American Redstart **Setophaga ruticilla**		C	Wo	M	F	pos
Ovenbird **Seiurus aurocapillus**		A	Wv	M/SR	F	prob

Northern Waterthrush ***Seiurus noveboracensis***		U	Lf	M	F			
Mourning Warbler ***Oporornis philadelphia***		U/C	Wf	M/LSR	F			
Common Yellowthroat ***Geothlypis trichas***		—		M/LSR	F			con
Wilson's Warbler ***Wilsonia pusilla***		—		M	F			
Canada Warbler ***Wilsonia canadensis***		U	Wf	M	F			
Yellow-breasted Chat ***Icteria virens***	NrPrRr	R	Lv	—	F	GSM		pos
Scarlet Tanager ***Piranga olivacea***		C	Wv	SR	F			con
Northern Cardinal ***Cardinalis cardinalis***		V	We	PR	F			con
Rose-breasted Grosbeak ***Pheucticus ludovicianus***		A	We	SR	F			con
Indigo Bunting ***Passerina cyanea***		V	We	SR	F	Mc!	1 sm	pos
Rufous-sided Towhee ***Pipilo erythrophthalmus***		V	We	SR	F	M		pos
Chipping Sparrow ***Spizella passerina***		A	We	R	F	M		con
American Tree Sparrow ***Spizella arborea***		—		WR	F			
Field Sparrow ***Spizella pusilla***		A	We	SR	F	M	Mc! 3 sm	con
Vesper Sparrow ***Pooecetes gramineus***		C	Wv	SR	F			con
Savannah Sparrow ***Passerculus sandwichensis***		A	We	SR	F			con
Grasshopper Sparrow ***Ammodramus savannarum***		U	Wf	SR	F			prob
Song Sparrow ***Melospiza melodia***		A	We	PR/SR	F			con
Swamp Sparrow ***Melospiza georgiana***		A	Wv	LSR	F			con
White-throated Sparrow ***Zonotrichia albicollis***	Rr	R	Le	I M	F	M		
White-crowned Sparrow ***Zonotrichia leucophrys***		—		M	F			

Dark-eyed Junco **Junco hyemalis**	Rr	R	Le	WR	F		
Snow Bunting **Plectrophenax nivalis**		—		WR	F		
Bobolink **Dolichonyx oryzivorus**		C/V	We	SP	F		con
Red-winged Blackbird **Agelaius phoeniceus**		A	We	SR	F M		con
Eastern Meadowlark **Sturnella magna**		C/V	We	SR	F		prob
Common Grackle **Quiscalus quiscula**		A	We	SR	F M		con
Brown-headed Cowbird **Molothrus ater**		A	We	SR	F M		con
Orchard Oriole **Icterus spurius**	NrPrRr	R	Wf	—	GSM		prob
Northern Oriole **Icterus galbula**		V/A	We	SR	F	2 sm	con
Purple Finch **Carpodacus purpureus**	Rr	R	Lv	M	F		
American Goldfinch **Carduelis tristis**		A	We	PR	F M	Mc! (sh)	con
Evening Grosbeak **Coccothraustes vespertinus**	Rr	R	Le	C WR	F		
House Sparrow **Passer domesticus**	• ·	A	We	PR	F	B! 1 n	con

APPENDIX F: MAMMAL FAUNA OF THE ORISKANY SANDSTONE AND WOODLANDS AREA OF NATURAL AND SCIENTIFIC INTEREST

SIGNIFICANCE

Nr	Nationally rare
Pr	Provincially rare
Rr	Regionally rare
•	introduced

ABUNDANCE

(Haldimand-Norfolk Region, number of sightings, after Gartshore 1987)

A	abundant (> 100 since 1972)
V	very common (50 - 100)
C	common (25 - 50)
U	uncommon (5 - 25)
R	rare (1 - 5)
I	increasing
H	hypothetical

SOURCES

B	S. Banticks: resident
DF	H. Dewar & C. Furlonger: 29 Aug. 1985 (in GSM)
F	M. Furber: July 1979 - July 1980
G	M.E. Gartshore: 28 Aug. 1985, 4 Sept. 1985
GSM	Gartshore, Sutherland & McCracken 1987 (Vol. II: Mammals)
M	I.D. Macdonald: 7 - 22 August 1988
Mc	J. McCracken: 22 Sept. 1985
O	M. Odejans: late Oct. 1986, early Nov. 1986
!	individual or specimen seen or caught
s	signs of species

Opossum **Didelphis virginiana**	NrPr	C I	F B
Northern Short-tailed Shrew **Blarina brevicaudata**		V	O!
Star-nosed Mole **Condylura cristata**		C	M!
Little Brown Myotis (Bat) **Myotis lucifugus**		C	G! DF! GSM
[Small-footed Bat **Myotis leibii**]		H	DF? GSM
Northern Long-eared Myotis (Bat) **Myotis septentrionalis**		C	G! Mc! DF! GSM
Big Brown Bat **Eptesicus fuscus**		C	G!
[Hoary Bat **Lasiurus cinereus**]		H	G GSM

Eastern Cottontail **Sylvilagus floridanus**		C	F M!
European Hare **Lepus capesis**	*	C	B F M!
Eastern Chipmunk **Tamias striatus**		C	B F M!
Woodchuck **Marmota monax**		C	B F M!
Eastern Gray Squirrel **Sciurus carolinensis**		C	B F M!
Red Squirrel **Tamiasciurus hudsonicus**		C	B F
Southern Flying Squirrel **Glaucomys volans**	(Nr)	C	F Mc! GSM
White-footed Mouse **Peromyscus leucopus**		C	F O!
Prairie Deer Mouse **Peromyscus maniculatus bairdii**		C	F O!
Muskrat **Ondatra zibethicus**		C	F M!
Woodland Vole **Microtus pinetorum**	(Nr)	C	F! O! GSM
Meadow Vole **Microtus pennsylvanicus**		A	F O!
House Mouse **Mus musculus**	*	C	F
Meadow Jumping Mouse **Zapus hudsonius**		C	F
[Porcupine **Erethizon dorsatum**]		H	F (GSM)
Coyote (includes 'Brush Wolf') **Canis latrans**		C	B
Red Fox **Vulpes vulpes**		C	B F V
[Gray Fox **Urocyon cinereoargenteus**]	NrPrRr	R	B
Raccoon **Procyon lotor**		C	F M!
Long-tailed Weasel **Mustela frenata**		C	F M!
Striped Skunk **Mephites mephites**		C	F M!
White-tailed Deer **Odocoileus virginianus**		C	F M!

SIGHTINGS OF SIGNIFICANT MAMMAL SPECIES WITHIN ANSI

Opossum (**Didelphis virginiana**) - Furber (in de Boer et al 1982) lists this small woodland marsupial from the ANSI, and Banticks indicates a permanent population in the woodlands east of Dry Lake Road.

[Small-footed Bat (**Myotis leibii**) - Gartshore (1987) cites a report by Dewar et al. (1985) who detected and identified the calls, and two individuals netted here on 29 Aug. 1985. However, she maintains these as hypothetical occurrences since the individuals were released before verifying measurements or photographs could be taken. She surmises that the species may hibernate in suitable crevices within the ANSI]

[Hoary Bat (**Lasiurus cinereus**) - Gartshore (1987) reports a possible occurrence of this solitary bat from the ANSI, based on identification of its calls and sightings; however, she maintains this only as a hypothetical record since no individuals were caught for confirmation]

Southern Flying Squirrel (**Glaucomys volans**) - This is a regionally common woodland mammal which is listed as a COSEWIC candidate species and is rare in Canada. Furber (in de Boer et al. 1982) and Gartshore (1987) list it from the ANSI but do not indicate population status.

Woodland Vole (**Microtus pinetorum**) - This Carolinian woodland species is rare in Canada and Ontario. Gartshore (1987) indicates that an individual "was obtained in 1984 from a woodlot" at the ANSI by Furber. Additionally she indicates that one individual was caught by Odejans in dry hawthorn field and oak woods habitat in Oct. 1986.

[Porcupine (**Erethizon dorsatum**) - Furber (in de Boer et al. 1982) indicates the ocurrence of this species in the ANSI, but no additional information is provided. Neither Banticks nor Vanderburg recall having seen evidence of this species in the past three decades. Gartshore (1987) maintains this species as hypothetical within the region.]

[Gray Fox (**Urocyon cinereoargenteus**) - This distinctive woodland species is officially recognized as rare in Canada by COSEWIC and rare in Ontario the OMNR. Gartshore (1987) indicates that it is regionally rare as well. Banticks indicates sighting "a grey-coloured fox" in the ANSI in the past 5 years. This may have been a Gray Fox, however, lacking positive determination, it is accepted as hypothetical for the ANSI.]

APPENDIX G: LIFE SCIENCE INVENTORY CHECKSHEET FOR THE ORISKANY SANDSTONE AND WOODLANDS AREA OF NATURAL AND SCIENTIFIC INTEREST

(3 pages)

AREA OF NATURAL AND SCIENTIFIC INTEREST – LIFE SCIENCE INVENTORY CHECK-SHEET

NAME	MAP NAME	MAP NUMBER	UTM REF.
Oriskany Sandstone and Woodlands	Dunnville	30 L/13	860560

COUNTY, DISTRICT or REGIONAL MUNICIPALITY: Haldimand - Norfolk

LAT.	LONG.	ALT. MIN.	ALT. MAX.
42° 56' N	79° 57' W	205 m	221 m

LOCALITY: 7 km west of Cayuga

TOWNSHIP	LOTS	CONCESSIONS
Oneida Township	46 - 51	I
North Cayuga	46 - 51	IN

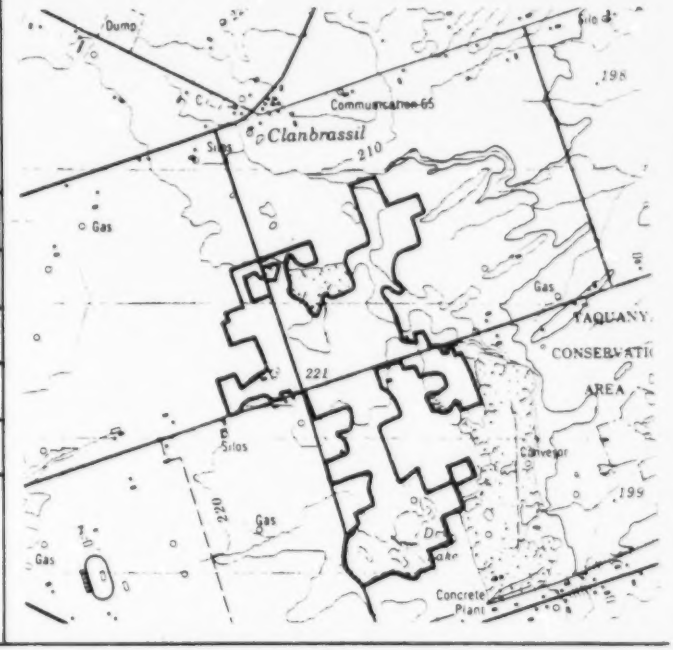
AREA: 755 acres 306 ha

OWNERSHIP: private / Nelson Aggregates

ADMINISTRATION:

FOREST REGION AND DISTRICT	SITE REGION AND DISTRICT
7-2	D.1
MNR REGION AND DISTRICT	**CONSERVATION AUTHORITY**
Central/Niagara	Grand River

1:50,000 NTS MAP SHOWING AREA BOUNDARIES



AERIAL PHOTOGRAPHS — BASE MAP: 428794

YEAR	ROLL	FLIGHT LINE	NUMBERS
78	26	4267	46 - 49
78	38	4266	104 - 107
78	38	4265	7 - 9

PHYSICAL AND BIOLOGICAL FEATURES

The Oriskany Sandstone and Woodlands Area of Scientific and Natural Interest is situated in Site District 7 - 2 at the edge of the Norfolk Sand Plain and Haldimand Clay Plain Physiographic Regions. It has a surface area of 306 ha, all of which is under private ownership. A major portion is owned by a quarry company. The study area includes the Life Science ANSI, and additional areas related to the Oriskany Sandstone Earth Science ANSI.

The area is distinguished by the bedrock outcroppings of the Oriskany Sandstone Formation, of which this is the only provincial occurence. This area was recognized by many researchers as having the following significances: this is the only outcrop of the Oriskany Sandstone in Ontario; its karst landforms associated with this bedrock are of geological interest; the natural vegetation associated with this bedrock is unique in Ontario; the flora includes several nationally, provincially and regionally significant species; the fauna includes a nationally, provincially and regionally rare and threatened snake population.

A conflict over the development of a quarry here in the 1970s resulted in a compromise 'Environmental Protection Zone' on some of the property. Provincial park systems planning and the 1983 District Land Use Guidelines identified the area as an ANSI following research conducted in the past decade to identify areas of significant earth and life science features.

DATA SHEETS ATTACHED

PHYSICAL DESCRIPTION	☐	SUMMARY SPECIES LISTS	☐
VEGETATION SUMMARY	☐	PHYSICAL FEATURES MAP	☐
EVALUATION SHEET	☐	VEGETATION MAP	☐
COMMUNITY DESCRS.	☐	BIBLIOGRAPHY	☐
COMMUNITY COMP. LISTS	☐	PHOTOGRAPHS	☐

MAJOR INFORMATION SOURCES

Beechey 1977. (checksheet, comments)
Fahselt et al. 1979. (conservation paper)
de Boer et al. 1982. (thesis, conservation paper)
Macdonald 1989. (life science inventory)
Gartshore et al. 1987 (natural areas inventory)

EVALUATION: Management considerations of particular concern are the maintenance of those vegetation communities associated with the sandstone environment, the monitoring of the significant plant and snake species, and the expansion of our understanding of the significant natural features.

DATE COMPILED	COMPILER
30 March 1989	Ian D. Macdonald 190

Earth science studies of Winder (1977.a), Davidson (1977) and others identified within the ANSI and its immediate vicinity 6 geological and geomorphological features which are of provincial or regional significance, as follows: Provincial Significance: Oriskany Sandstone Bedrock (the only outcrop of this formation in Ontario, and 90% of its total natural exposure lies within the ANSI), Dry Lake Basin Sink Complex (large example of this solution / collapse feature occuping half of the ANSI's southern arm); Regional Significance: Onondaga Escarpment (the western end of this Niagara Peninsula escarpment is in northeastern portion of ANSI), clay knolls (unexplained low circular mounds, with 17 in ANSI and immediate vicinity), low secondary escarpments (2 m to 3 m high escarpments with fossil features, with 3 in the ANSI), local sinkhole collapses (relatively undisturbed small karst features with 3 in ANSI), and drumlins (western edge of drumlin field, barely entering the ANSI).

The vegetation research of Maycock (1977.a) and others emphasized the significance of the oak - hickory forests which occur on the dry sandstone sites of the area. Further studies (Ball 1977, de Boer et al. 1982, Macdonald 1988) also recognized the significance of other upland forests, and of lowland and wetland features. The present study recognizes 63 community patterns within the study area, based upon their substrates, composition, community structure and developmental history. The significant vegetation is that which is associated with, and dependent upon, the surficial and near surface exposures of sandstone bedrock, particularly since such environmental conditions do not exist elsewhere in Ontario. There are 6 significant upland dry forests and 4 barrens./.meadows./.thicket communities which are associated with the sandstone outcrops of the area. As well, there are 4 other significant forest communities which are associated with landforms other than the sandstone outcrops, notably the Onondaga Escarpment and local limestone outcrops, 3 significant lowland forest./.thicket communities which are characteristic of the Haldimand Clay Plain Physiographic Region, and 1 significant wetland meadow community which is dependent upon the distinctive drawdown features of the Dry Lake ponds. The old and recent quarry communities are also of interest. Significant communities occurring within the ANSI are the following: Dry Sandstone Forest Communities: (oak opening, forest (red oak - white oak - shagbark hickory), disturbed forest (red oak - white oak - trembling aspen, shagbark hickory - black cherry), forest (red oak - bitternut hickory - white pine - yellow oak - red maple - white oak), sink hole mosaic forest (red oak - white oak - red maple - sugar maple - black cherry - large-toothed aspen - American beech), forest (red oak - white oak - sugar maple); Mesic Forest Communities: forest (red maple - red oak - white oak - sugar maple - American beech - shagbark hickory - bitternut hickory - eastern white pine), forest (sugar maple - red oak - white ash - American beech), managed forest (sugar maple - red ash - white ash), successional forest complex (sugar maple - red oak - white oak - shagbark hickory - white ash - large-toothed aspen), Sandstone Pavement Communities: sandstone pavement barrens, sandstone pavement meadow, sandstone pavement thicket, old field prairie inclusions; Lowland Communites: slough thicket (buttonbush), slough fringe grove (silver maple - green ash - swamp white oak - white elm - willow), swamp forest (silver maple - green ash - white elm - swamp white oak); Wetland Basin Communities: pond fringe drawdown meadow; Historical Prairie Community: prairie meadow; Quarry Successional Communities: recent scraped bedrock pavement preparation barrens, old scraped bedrock pavement preparation barrens / meadow, quarry basin barrens / meadow complex, quarry basin thicket / meadow complex, quarry tip pile forest complex.

Floristic research has been conducted here by Ball, Maycock, de Boer, Suffling, Alex, Sutherland, Kaiser, Macdonald and others. This documented a total flora of 627 species, including 8 hybrids, 11 infraspecific taxa and 144 non-native species. The species exhibit affinities to the southern, Carolinian and northern floras. There also are 'dry prairie' affinites for which 29 characteristic 'species were recorded from the former prairie meadow, 16 of which do not occur elsewhere in the ANSI. About 23% of the species have Old World origins. 71 significant plant species occur within the study area, including 12 which are nationally and provincially rare, 27 which are regionally rare, 22 which are regionally very uncommon, and 10 which are newly reported from the Haldmand.-.Norfolk. Concentrations of the nationally and provincially species occur in 5 sections of the ANSI: around the Dry Lake Basin (UTM 864544), south of Town Line Road (UTM 862552), north of Town Line Road (UTM 864556), south of the recent quarry (UTM 859559) and in the ANSI's northeastern corner (UTM 865565). Nationally and provincially rare species are the following: **Carex gracilescens** (sedge), **Castanea dentata** (American sweet chestnut), **Crataegus dodgei** (hawthorn), **Desmodium rotundifolium** (prostrate tick-trefoil), **Disporum lanuginosum** (yellow mandarin), **Frasera caroliniensis** (American columbo), **Galium pilosum** (hairy bedstraw), **Lechea villosa** (hairy pinweed), **Linum virginianum** (Virginia yellow flax), **Ludwigia polycarpa** (many-fruited false loosestrife), **Viburnum recognitum** (southern arrowwood) and **Viola palmata** var. **palmata** (early blue wood violet).

Faunal research on the herptiles, birds and mammals within the ANSI and its vicinity have been conducted by Furber, Campbell, Gartshore and McCracken. Their work identified 7 amphibians, 9 reptiles, 139 birds and 26 mammals, as well as several tentative occurrences. These species generally are widespread, and several display southern and Carolinian affinites. 32 significant species are recorded, including 9 species which are nationally and provincially rare, and 24 which are regionally rare. The most significant is the Black Rat Snake, a nationally, provincially and regionally rare and threatened species. Its population size and staus within the ANSI are not fully understood. However, there are regular sightings of adults and juveniles within the immediate vicinity. At least one winter hibernaculum has been suggested (UTM 861552), and the present size and condition of the habitat features in the area may be adequate for maintaining at least a small population. The bird fauna of the area includes 3 nationally, provincially and regionally rare species: Red-bellied Woodpecker (summer resident which probably is breeding on the site), Yellow-breasted Chat and Orchard Oriole (no evidence

of residency). There also are 2 provincially and regionally rare migrants, 18 regionally rare migrants and 4 regionally rare winter residents. The mammal fauna of the area includes 3 nationally and provincially rare species which generally inhabit its upland forest sites: Opossum, Southern Flying Squirrel and Woodland Vole, notable population of 4 bat species, and an unconfirmed record for Gray Fox a nationally, provincially and regionally rare species. The documented significant species are as follows: Herptiles - Black Rat Snake (**Elaphne obsoleta obsoleta**); Birds - Red-bellied Woodpecker, Yellow-breasted Chat, Orchard Oriole; Mammals - Opossum, Southern Flying Squirrel, Woodland Vole.

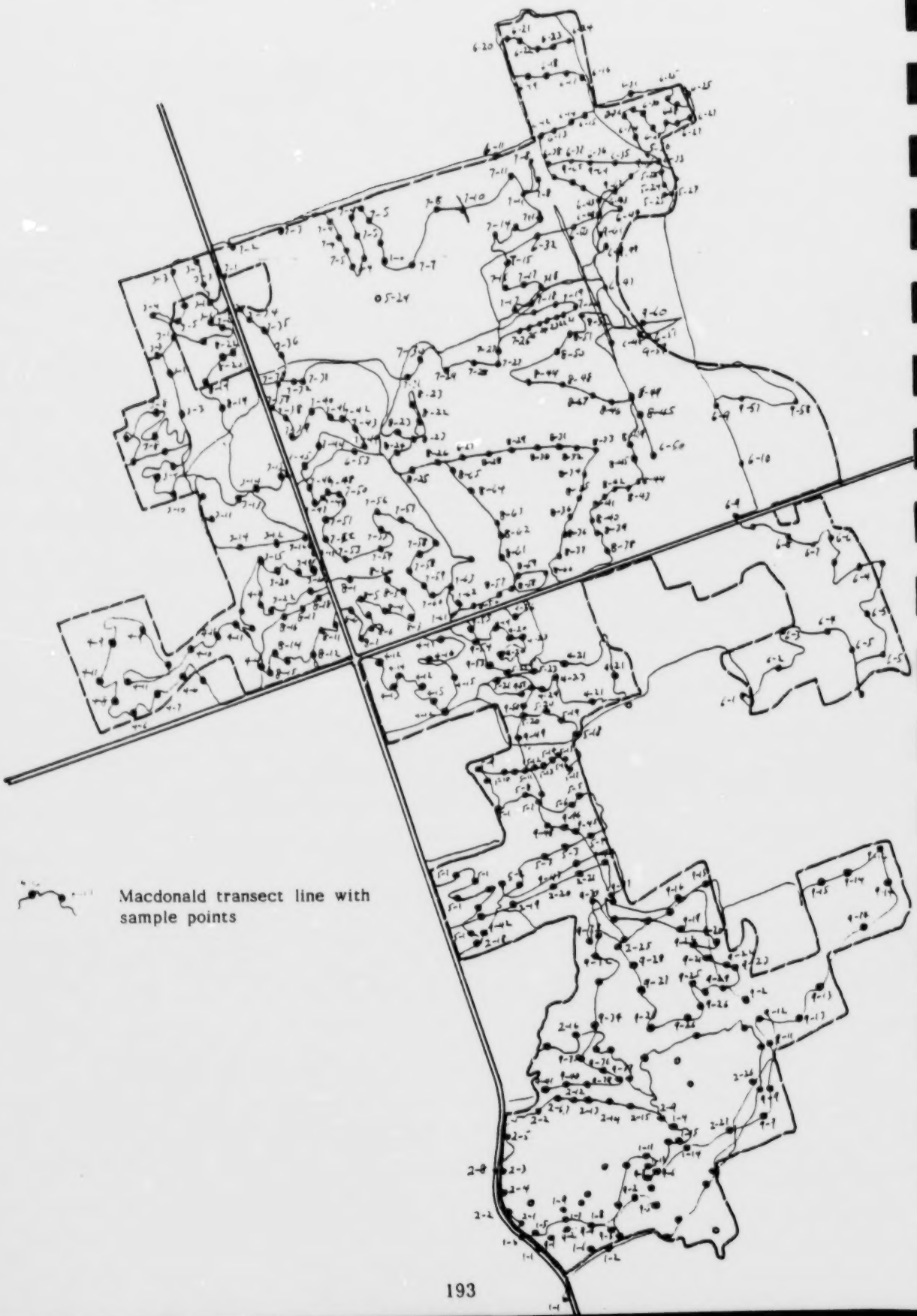
9 significant areas are identified within the ANSI, and 1 in its immediate vicinity. These areas incorporate those significant vegetational, floral and faunal, and earth science features which contribute to the life science representation within the province.

PROVINCIALLY SIGNIFICANT AREAS
- Area A: Oriskany Sandstone Dry Oak - Hickory Forests
- Area B: Oriskany Sandstone Forests and Pavements
- Area C: Dry Lake Basin Ponds and Forests

REGIONALLY SIGNIFICANT AREAS
- Area D: Onondaga Escarpment and Forests
- Area E: Oriskany Sandstone Fossil Ledge
- Area F: Oriskany Sandstone and Old Quarry Dry Forest
- Area G: Old Oneida Quarry Succession
- Area H: Cayuga Limestone Pavement Dry Forest
- Area I: Oriskany Sandstone Prairie Meadows

OTHER SIGNIFICANT AREAS (outside ANSI boundary)
- Area J: Nelson Onondaga Sandstone Quarry

APPENDIX H: SURVEY TRANSECTS OF IAN D. MACDONALD, 9 - 22 AUGUST 1988 IN THE ORISKANY SANDSTONE AND WOODLANDS AREA OF NATURAL AND SCIENTIFIC INTEREST



Macdonald transect line with sample points

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(0.06k, P.R. 89 10 15)
ISBN 0-7729-5910-2

MAPS
NOT
FILMED

CARTES
OMISES